WORLD METEOROLOGICAL ORGANIZATION

RA V TROPICAL CYCLONE COMMITTEE FOR THE SOUTH PACIFIC AND SOUTH-EAST INDIAN OCEAN

EIGHTH SESSION

(RAROTONGA, COOK ISLANDS, 5 TO 11 SEPTEMBER 2000)

FINAL REPORT

GENERAL SUMMARY OF THE WORK OF THE SESSION

1. ORGANIZATION OF THE SESSION (Agenda item 1)

1.1 Opening of the session (agenda item 1.1)

1.1.1 At the kind invitation of the Government of the Cook Islands, the eighth session of Regional Association V (RA V) Tropical Cyclone Committee for the South Pacific and South-East Indian Ocean was held at the Edgewater Resort Hotel, Cook Islands from 5 to 11 September 2000.

1.1.2 The session was opened at 09.00 a.m. on Tuesday, 5 September 2000, with a warm welcome by Mr Arona Ngari, Permanent Representative of the Cook Islands with WMO.

1.1.3 Speaking on behalf of Professor G.O.P. Obasi, the Secretary-General of the World Meteorological Organization (WMO), Mr Katsuhiro Abe, the WMO Secretariat representative at the session, expressed the sincere appreciation of WMO to the Government of the Cook Islands for hosting the eighth session of the Committee in Rarotonga. He stated that the Secretary-General emphasized his close interest in the important work being done under the RA V Tropical Cyclone Committee towards the mitigation of cyclone disaster in the Region. Mr Abe assured the session that WMO would continue to support the Committee, to the extent possible, in its effort to attain its humanitarian goals. Finally, he wished the Committee a successful session.

1.1.4 Dr Lim Joo Tick (Malaysia), the President of Regional Association V (South-Pacific), expressed his gratitude to the Government of the Cook Islands for the kind invitation to host the biennial session of the Committee on this beautiful island of Rarotonga. He thanked the Permanent Representative of the Cook Islands with WMO, Mr Arona Ngari, for a warm welcome extended to all participants. Dr Lim urged the Committee to upgrade the capabilities of the national Meteorological and Hydrological Services (NMHSs), in particular, the Small Island Developing States, with a view to providing better tropical cyclone forecasts and more effective warning services. He wished the participants a fruitful meeting and an enjoyable stay in the Cook Islands.

1.1.5 Honourable Dr Terepai Maoate, Prime Minister, welcomed all participants and thanked the WMO for the opportunity given to the Cook Islands to host a WMO meeting in his country for the first time. He hoped that similar opportunities would come in the future. The Prime Minister pointed out that the Cook Islands lies within a so-called “hurricane belt”. Cyclone “Sally” of New Year’s Day in 1987 is still fresh in the memory, as is the tragedy of Cyclone “Martin”, which struck more than a decade later. He stated that, with each passing threat, we learned more and more about the crucial nature of information and communication, how much modern technology such as the Inmarsat must be factored into our isolated lives, and how these links are often our lifelines. The need for advance weather information and disaster preparedness has become a way of life for our survival on small, widely scattered atolls, across vast distances of ocean. The Prime Minister wished the Committee a successful meeting built on solid cooperative efforts. He concluded by formally declaring the session open.

1.1.6 The session was attended by 31 participants from 16 Members of WMO, two non-Members of WMO and four observers from international and regional organizations. The list of participants in the session as well as the capacities in which they attended is given in Appendix I.

1.2 Adoption of the agenda (agenda item 1.2)

1.2.1 The Committee adopted the agenda for the session as given in Appendix II, with the exception that item 6 would be built into the relevant parts of items 5 and 7.

1.3 Election of vice-chairman (agenda item 1.3)

Mr Arona Ngari (Cook Islands) was unanimously elected as vice-chairman of the eighth session of the Committee.

1.4 Working arrangements for the session (agenda item 1.4)

The Committee agreed that the working of the session be conducted in one committee as a whole, in English with whispered interpretation in French. Small working groups would be

established as necessary to consider specific topics to facilitate the working of the session. The Committee also agreed on its working hours with breaks in the morning and afternoon sessions.

2. REPORT OF THE CHAIRMAN OF THE COMMITTEE (Agenda item 2)

2.1 The Chairman presented his report on the main activities and progress achieved since its seventh session (Denpasar, Bali, Indonesia, 8 to 12 September 1998) (see Appendix III).

2.2 The Committee was challenged about issues that put pressure on the performance of the Tropical Cyclone Warning System viz. the late arrival of alerts and/or warnings and delays in naming a suitable disturbance.

2.3 The Committee was very grateful to the European Union (EU) Cyclone Warning System Upgrade Project for the training provided, the acquisition of new equipment and the opportunities for various National Meteorological Services to develop their potential.

2.4 The Committee was informed of the outcomes of the two technical coordination meetings held in Fiji and Brisbane and the fourteenth session of the RA I Tropical Cyclone Committee. A number of proposals contained in the appendices to the report were discussed in more detail under later agenda items.

2.5 In connection with the philosophy of issuing one, fully self-contained marine warning on a tropical cyclone, Mr Rajendra Prasad (Fiji) believed it was up to the other centre to provide any extra details to the centre with primary responsibility. On the subject of the “naming rights of a special breed of cyclone”, the meeting accepted it was more a bilateral issue between New Zealand and Australia rather than one for regional discussion. Both countries need to liaise over the future of this proposal.

2.6 Mr Jacki Pilon (French Polynesia) requested WMO to investigate whether the publication “A Scale Relating Tropical Cyclone Wind Speed to Potential Damage For The Tropical Pacific Ocean Region: A User’s Manual” by Messrs Charles Guard and Mark Lander could be translated into French.

2.7 The Committee wishes to thank the South Pacific Regional Environment Programme (SPREP) for the part it continues to play in maintaining the close working relationship with WMO.

3. COORDINATION WITHIN THE WMO TROPICAL CYCLONE PROGRAMME (Agenda item 3)

3.1 The Committee noted with satisfaction the achievements and progress made in both the general component and the regional component of the TCP since the seventh session of the Committee (Denpasar, Bali, Indonesia, September 1998).

3.2 The Committee was pleased to note further strengthening of close cooperation between the RA I Tropical Cyclone Committee (RA I/TCC) for the South-West Indian Ocean and the RA V Tropical Cyclone Committee (RA V/TCC) for the South Pacific and South-East Indian Ocean. It noted with pleasure that the Bureau of Meteorology, through Mr Len Broadbridge, Regional Director of the Tropical Cyclone Warning Centre Perth, would continue active cooperation with the Mauritius Meteorological Service and the RSMC La Réunion - Tropical Cyclone Centre. The Committee was informed that Mr S.N. Sok Apadu (Mauritius) was designated as the interim Chairman of the RA I/TCC, who is an ex-officio member of the RA V/TCC.

3.3 The Committee recognized a continuing need for upgrading the skills of tropical cyclone forecasters from small island states in the South Pacific, in the context of UN Resolution on Sustainable Development of Small Island Developing States and within the framework of the International Strategy for Disaster Reduction (ISDR) (post-IDNDR). It was gratified by the organization of the fourth Southern Hemisphere Training Course on Tropical Cyclones, which would be held at the Bureau of Meteorology in Melbourne, from 16 to 27 October 2000. The Committee expressed its gratitude to Australia and WMO for the organization of the course and requested them to make every effort to organize further courses in this series.

3.4 The Committee stressed the need for promoting the development of public information, education, and awareness on tropical cyclones as essential components of national Meteorological and Hydrological Services' strategies.

3.5 In recognizing the importance of strengthening the technical coordination among Tropical Cyclone (TC) Regional Specialized Meteorological Centres (RSMCs), Tropical Cyclone Warning Centres (TCWCs) (Brisbane, Darwin, Perth, Port Moresby, Wellington) and Central Pacific Hurricane Center in Honolulu, the Committee was pleased to note that the fourth TC RSMCs Technical Coordination Meeting would be held, tentatively at the RSMC Nadi –Tropical Cyclone Centre, in November 2002.

3.6 The Committee noted with pleasure that the Tropical Cyclone Programme (TCP) home page on the WMO web page (http://www.wmo.ch/web/www/TCP/trop-cyc.html) was continuously being updated.

4. REVIEW OF THE 1998/1999 AND 1999/2000 CYCLONE SEASONS (Agenda item 4)

4.1 There were a total of 37 tropical cyclones across the area from the South-East Indian Ocean to south-east Pacific - 17 named by Perth TCWC; 12 by Nadi RSMC; six by Brisbane TCWC and two by Darwin TCWC. About 50% of these cyclones were hurricanes, including nine major hurricanes, and Thelma which crossed the Kimberly coast of Western Australia in December 1998 was considered strongest, with estimated maximum sustained winds of 120 knots. Other cyclones to make landfall around northwest Australia were Vance in March 1999 which devastated the northwest of the town of Exmouth, producing a measured wind gust of 267 km/h which is the highest wind speed ever recorded on mainland Australia; also Gwenda, Ilsa, John, Steve and Rosita. Steve described a very interesting path, journeying from the eastern side of Australia to the western side via the Gulf of Carpentaria. It lost tropical cyclone intensity three times before making landfall over Shark Bay about 500 kilometres north of Perth, two weeks after starting out as a tropical cyclone in the Coral Sea. At no stage did Steve make hurricane intensity, preferring to stay close to the coast instead of wandering out to the energy-rich open sea. Its influence on the general circulation didn't stop there. Eventually, a depression formerly cyclone Steve entered the sea again over the Great Australia Bight and wound up into a deep mid-latitude storm as it speed away south-eastwards to the south of Tasmania on the 13th and 14th of March 1999. Dani, with estimated maximum sustained winds of 95 knots crossed over northern parts of Vanuatu and was the only major hurricane in the South Pacific. There were three cyclones with double names viz. Damien/Birenda, Frederic/Evrina and Leon/Eline. The double-barrelled cyclone name is a consequence of what happens when a tropical cyclone shifts from the Perth to the La Réunion area of responsibility. To ensure a smooth transition from one name to another, La Réunion holds onto two names for 24 hours after the cyclone crosses the boundary at 90°East. After Eline dropped its other name, it passed across Madagascar into Mozambique where the flood situation shifted from serious to calamitous. There were a few midget or very small diameter tropical cyclones. Iris, one of them kicked off a late start to the 1999/2000 season for the South Pacific when it scraped past the islands of Malekula and Epi, in northern Vanuatu in early January 2000. Moderate La Niña conditions persisted throughout both cyclone seasons, with cool sea surface temperature anomalies in the central and eastern equatorial Pacific, stronger than normal trade winds and Southern Oscillation index running between 0.9 and 1.8 standard deviations above the mean. The concentration of cyclone activity in the Australian, Vanuatu and New Caledonia areas was obviously a reflection of this background climatology. However, six cyclones did form east of 180°, including Kim, which acquired tropical cyclone intensity south of 20°South in the French Polynesia area.

4.2 The representative of the RSMC Nadi presented the comprehensive reports on seasonal cyclone summary of the 1998/1999 tropical cyclone season and of the 1999/2000 tropical cyclone season, respectively. These reports are given in Appendices IV and V.

4.3 The summary reports on the 1998/1999 and 1999/2000 cyclone seasons provided by Member countries are given in Appendix VI.

4.4 The representatives from Niue and Tonga revealed the strain under which the local warning system operated during Cora and Mona through delayed or untimely bulletins (Niue and Tonga) and a break down in communications (Tonga only).

4.5 The Committee reiterated that the general public do not understand meteorological terms on tropical cyclones very well and often misunderstand their meanings, e.g., confusion between "wind direction" and "movement direction" of tropical cyclones. To this effect, it urged Members to promote activities concerning public information, education, and awareness on tropical cyclones. The Committee also urged Members to use, as much as possible, plain language in tropical cyclone warning messages.

5. REVIEW OF THE TROPICAL CYCLONE OPERATIONAL PLAN FOR THE SOUTH PACIFIC AND SOUTH-EAST INDIAN OCEAN (Agenda item 5)

5.1 The Committee examined in detail and discussed in-depth the proposed changes to the text of the Tropical Cyclone Operational Plan for the South Pacific and South-East Indian Ocean. It took into account experiences gained during the past cyclone seasons; implementation of items in the Committee's Technical Plan; and other relevant changes during the inter-session.

5.2 The Committee discussed at length the following terminology and finally agreed to a change in definitions as follows:

> ***"Tropical Cyclone: A non-frontal cyclone of synoptic scale developing over tropical waters and having a definite organized wind circulation with a maximum 10- minute average wind speed of 34 knots (63 km per hour) or greater."***
>
> ***"Tropical Depression: A tropical disturbance in which the central position can be identified and the maximum 10-minute average wind speed is less than 34 knots (63 km per hour)."***

5.3 As a result of the changes in 5.2 above, the representatives of Fiji were concerned about the risk of assigning names to disturbances that just met the criteria but failed to develop much or any further. To clarify the naming procedure, the following was inserted under "Naming tropical cyclones". ***A tropical depression will be named as a tropical cyclone whenever observations and/or Dvorak intensity analysis indicate the presence of gale force winds that are likely to continue.***

5.4 The Committee recommended to the President of RA V the approval of the amendments to the text of the Operational Plan. The President of RA V approved these amendments.

5.5 The Committee urged Members that any subsequent changes to the attachments to the Operational Plan should be submitted to the Chairman by the end of September for timely issuance by WMO of a new edition, i.e., prior to the forthcoming cyclone season.

5.6 The Committee requested the Secretary-General of WMO to publish a new edition of the Tropical Cyclone Operational Plan in English and French versions as a WMO Technical Document (WMO/TD-No. 292) in the TCP series (TCP Report No. TCP-24), as soon as possible.

5.7 The Committee requested SPREP to facilitate a forecast and warning service between Fiji and Nauru. Fiji will advise the Chairman when arrangements have been put in place.

6. FORMULATION OF THE TECHNICAL PLAN AND ITS IMPLEMENTATION PROGRAMME (2001–2002) (Agenda item 6)

(a) Under this agenda item, the Committee established a working group under the chairmanship of Mr Len Broadbridge (Australia) to carry out, during the session, formulation of a new Technical Plan for future development of services for the period 2001 and 2002;

(b) On 8 September, the working group undertook the formulation of this Plan;

(c) The Committee ultimately concurred with the Plan submitted by the chairman of the working group. The Plan is reproduced in Appendix VII;

(d) The Committee carried out a wide-ranging review of the developments and activities under

the five components. A summary of the discussions, and the main conclusions and proposals other than those reflected in the Plan are given below.

6.1 Meteorological component (agenda item 6.1)

6.1.1 The Committee was pleased to note the general improvement of meteorological equipment and facilities in the Region, in particular under the implementation of the EU Cyclone Warning System Upgrade Project (1997–2000). In view of the highly technological nature of many items of this equipment, it identified the need for sharing of resources by Members for sustainable development. In this context, it requested more developed nations in the region, like Australia, France, Japan, New Zealand, and the USA, to assist the Pacific Island countries in addressing their maintenance and support requirements.

Surface-based Observing System

6.1.2 As regards meteorological observations, the Committee noted the information provided on the status of implementation of the regional basic synoptic networks of surface and upper-air stations as well as on the relevant results of the monitoring of the operation of the WWW system. It noted that the overall level of implementation was a satisfactory level as regards surface observations, but that upper-air observations at 12 Universal Time Coordinated (UTC) were relatively sparse.

6.1.3 Since the information provided to the Secretariat on the observing programmes have not been kept up to date, the Committee urged Members to check the information given in Volume A of WMO Publication No. 9 and to advise the Secretariat on a regular basis of any changes that were necessary.

Meteorological satellites

6.1.4 The Committee was informed by the Secretariat that ten out of 21 RA V Members are equipped with at least one polar-orbiting receiver (either Automatic Picture Transmission (APT) or High Resolution Picture Transmission (HRPT)). Thirteen out of 21 Members have at least one geostationary receiver (either WEFAX or high resolution). Recalling that the World Weather Watch (WWW) implementation goals require a WMO Member to have at least one polar-orbiting and at least one geostationary receiver, another eleven RA V Members require polar-orbiting receivers and eight RA V Members require geostationary receivers.

6.1.5 The Committee noted with appreciation the latest detailed information on geostationary and polar-orbiting meteorological satellites, applicable for the Pacific region, as given in Appendix VIII.

Meteorological telecommunications

6.1.6 There has been significant progress in the implementation and upgrading of the Global Telecommunication System (GTS) in Region V. However, the Committee noted with concern that there were still a few shared low speed Aeronautical Fixed Telecommunications Network (AFTN) links in the Pacific area.

Marine observations

6.1.7 The Committee noted that in its oceanic area of interest only Sea Surface Temperature (SST) observations have reached a satisfactory coverage. In addition, most of the observational data is derived from drifting and moored buoys.

6.1.8 The Committee was pleased to note that the Automated Shipboard Aerological Programme (ASAP) Panel is in the process of developing a Worldwide Recurring ASAP Project (WRAP), which seeks to implement on a cooperative basis a round the world ASAP line, passing via southern Africa, Australia, New Zealand and Cape Horn, several times per year. This project will eventually provide some soundings at regular intervals on the southern fringes of the areas of

interest, in both the Indian and Pacific Oceans.

RSMC Nadi-Tropical Cyclone Centre

6.1.9 Nadi TCWC was formally designated by Resolution 4 (EC-XLVII) in June 1995 as an RSMC with activity specialization in tropical cyclone analysis, tracking and forecasting. The representative of the RSMC Nadi submitted "Report on RSMC Nadi activities since RA V/TCC 7th session in September 1998" to the session (see Appendix IX).

6.1.10 The Committee noted with pleasure the informative report provided by the RSMC Nadi.

6.1.11 The representative of Fiji advised Members that RSMC Nadi would review the "Damaging Swell Warning" threshold with the idea of lowering it to below four metres.

Tropical cyclone names

6.1.12 The Committee agreed that a tropical cyclone should only have one name during its life. When it tracks from one area of responsibility or basin to another, a cyclone should not be renamed. To this end, the Committee invited the RA I/TCC to consider at its next session in 2001 retaining the original name in the South Indian Ocean.

6.2 Hydrological component (agenda item 6.2)

6.2.1 The Committee noted that the RA V Tropical Cyclone Committee for the South Pacific and South-East Indian Ocean, as re-established by XII-RA V, has given special attention to the planning and implementation of measures for the improvement of cyclone warning systems and related meteorological services and facilities in efforts to minimize damage caused by tropical cyclones and related hazardous phenomena in the Federal States of Micronesia area and the tropical part of the Region south of the equator. The Committee has been asked to review regularly the status of tropical cyclone and flood forecasting systems in the Region and to coordinate any activities with the WMO Tropical Cyclone Programme and, in respect of flood warnings, with the RA V Working Group on Hydrology. The Committee noted the need for closer collaboration between the meteorologists and hydrologists. The Chairman of the Working Group on Hydrology, Mr Rishi Raj (Fiji), in consultation with the president of RA V, has designated rapporteurs to carry out the tasks mentioned in paragraph 6.2.2. A periodic newsletter from the chairman of the working group informs the national Hydrological Services (NHSs) in the Region of progress in the group's assignment.

RA V Working Group on Hydrology

6.2.2 The Committee was informed that the regional aspects of WMO's Hydrology and Water Resources Programme are carried out by the RA V Working Group on Hydrology, re-established by the twelfth session of RA V (Resolution 14 (XII-RA V)). The main activities assigned to the group are:

- To monitor, compile and report on research results on the hydrological effects of El Niño/Southern Oscillation (ENSO) in the Region and on their applications to water management;
- To address the needs of Small Island States in the areas of operational hydrology and water resources management;
- To monitor, compile and report on results on the hydrological effects of climate variability and change in the Region and their implications for water management;
- To prepare proposals for the development of World Hydrological Cycle Observing System (WHYCOS) components in the Region, including the exchange and supply of hydrological data and information;
- To survey the applications of Hydrological Operational Multipurpose System (HOMS)

in the Region and the opportunities for enhancing its utility;

- To consider and report on the appropriate education and training needs in accordance with the guidelines endorsed by the forty-eighth session of the Executive Council.

6.2.3 As a follow-up of the work of the group, a meeting of experts on hydrological needs of small islands was organized by the WMO Secretariat and hosted by the Government of Fiji from 4 to 6 October 1999. The meeting identified a number of specific areas, which need to be addressed in the Region. These include: training of hydrologists, water resources specialists and hydrological technicians; knowledge and information exchange and information transfer; guidance of legislation, policy and institutional development; and data capture, archiving and dissemination.

6.2.4 Immediate action was recommended for technician training and the development of a regional component (Pacific-HYCOS) of the World Hydrological Cycle Observing System (WHYCOS). With inputs from a number of countries of the Region, the WMO Secretariat has developed project proposals for both technician training and Pacific-HYCOS. Funding is being sought to implement both projects.

6.2.5 Pacific-HYCOS is particularly relevant to the work of the RA V Tropical Cyclone Committee in that one of its major components is expected to be a network of real-time data reporting stations. This would have important applications in such areas as hydrological forecasting and flood control. The Committee strongly recommended the WMO Secretariat to expedite the implementation of the Pacific-HYCOS and assist in flood forecasting system in the Region.

6.2.6 The Memorandum of Understanding signed in April 2000 by WMO and South Pacific Applied Geoscience Commission (SOPAC) provides a framework for a useful partnership to address water-related issues in the Region.

6.2.7 The HOMS Reference Manual (HRM) has been updated in July 2000 and can now be consulted on the World Wide Web at: http://www.wmo.ch. At present there are some 180 HOMS components.

6.3 Disaster prevention and preparedness component (agenda item 6.3)

6.3.1 The UN General Assembly, by its Resolution 44/236 of December 1989, proclaimed the 1990s the International Decade for Natural Disaster Reduction (IDNDR). The IDNDR came to an end in December 1999 with success in achieving substantial progress in natural disaster reduction at all levels.

6.3.2 The WMO has played a leading role through its major scientific and technical programmes in the framework and support of the IDNDR efforts as regards mitigation of, and preparedness for, natural disasters of meteorological and hydrological origin. The IDNDR Programme Forum was successfully held in July 1999 as the consolidation and closing event of the Decade under the title "A Safer World in the 21st Century: Disaster and Risk Reduction".

6.3.3 WMO and United Nations Education, Scientific and Cultural Organization (UNESCO), as the two principal United Nations agencies concerned with the scientific and technological aspects of disaster reduction, convened a "Sub-forum on Science and Technology in Support of Natural Disaster Reduction" as a special contribution to the IDNDR Programme Forum. The participants at the Sub-forum came from both the natural and social sciences and with both research and operational background in developing and developed countries and included several delegates from RA V. The Sub-forum reviewed the various ways in which science and technology contribute to the disaster reduction process in particular, through:

- Assessment of vulnerability and enhancement of community awareness of the nature of the risk;

- Operation of integrated warning systems;

- Preparedness and education programmes.

The Sub-forum reviewed recent progress and debated future prospects in each of these three aspects of the application of science and technology to reduction of the impacts of tropical cyclones, extra-tropical storms, storm surges, severe local storms and tornadoes, sand and dust storms, drought, extreme and persistent temperatures, fire weather, floods, landslides, avalanches, volcanoes, earthquakes and tsunamis. The proceedings of the Sub-forum have been published and distributed to Members.

6.3.4 The IDNDR has been succeeded by a new substantive programme, the International Strategy for Disaster Reduction (ISDR) that includes an Inter-Agency Task Force and an Inter-Agency Secretariat. On 22 December 1999, the UN General Assembly adopted Resolution 54/219, which provides specific guidance for the future work of the ISDR. The main objective of the ISDR is to enable communities to become resilient to natural hazards and to proceed from an approach of protection against hazards to the management of risk. It is structured around four main themes for action: public awareness, community and public authorities commitment, disaster resilient communities, and the reduction of socio-economic loss. The primary function of the Task Force will be to devise strategies and policies for the reduction of natural hazards; identify gaps in existing policies and programmes; ensure complementary action by agencies; provide policy guidance; and convene ad hoc meetings of experts on issues relating to disaster reduction.

6.3.5 The Secretary-General has taken various initiatives including those at the level of the UN Administration Committee on Coordination and the UN Secretary-General on the structure of the ISDR that will ensure a prominent role of science and technology and the operational activities of NMHSs in the implementation of the strategy. WMO has been designated a member of the Inter-Agency Task Force. The first meeting of the Task Force was held in Geneva from 27 to 28 April 2000. The main outcome of that meeting was the identification of areas of concern to be addressed by the Task Force and the establishment of *ad hoc* working groups to address these concerns. In this regard, the Task Force established:

- *Ad hoc* Working Group on El Niño/La Niña and climate change and variability for which WMO is designated as lead agency;

- *Ad hoc* Group on Early Warning in which WMO is a Member;

- *Ad hoc* Group on Quantification of Impacts, Vulnerability/Risk Assessment in which WMO is also a member.

The Task Force also decided to establish additional groups in the future as the need arises. In addition, the Task Force recommended that the IDNDR national committees continue their work as national committees for ISDR. WMO will play a lead role in the Inter-Agency Task Force.

6.3.6 Special lecture service “Outline of IFRC Activities” was made by Mr Abbas Gullet, Head of Regional Delegations for the Pacific, Suva, Fiji. The Committee noted working relationships between International Federation of Red Cross and Red Crescent Societies (IFRC) and NMHSs in the South-West Pacific.

For more information on IFRC, contact: Tel: + 679 31 16 55 / 31 16 65
Fax: + 679 31 14 06
E-mail: ifrcds@is.com.fj

6.3.7 The Committee was informed that a Disaster Management Unit was established in the South Pacific Applied Geoscience Commission (SOPAC).

Contact: Mr Alan Mearns
Head of Disaster Management Unit
SOPAC
E-mail: alan@sopac.org

6.4 Training component (agenda item 6.4)

6.4.1 The Committee was informed of the major training activities of WMO since its seventh session in 1998. It agreed that training events such as courses, workshops and seminars were of great value and an effective means of technology transfer and human resources development.

6.4.2 The Committee noted that most Members of the Committee find it difficult to use the Regional Meteorological Training Centre (RMTC) in the Philippines due to its remote location and, as a result, have attended training courses that meet their requirements closer to home. In this context, the Committee recommended that the WMO Secretariat explore the possibility of establishing a sub-regional RMTC for the Pacific region South of the Equator.

6.4.3 In addition to RMTCs, some national training institutions in the Region also offered training in meteorology and hydrology. Such training efforts contributed significantly to the training of personnel within as well as outside the Region. The Committee urged its Members to maximise use of such facilities whenever possible.

6.4.4 The Committee was informed that a Virtual Training Library (VTL) has been activated within the Education and Training Programme (ETRP) sub-page and urged its Members to make use of the resources of the Training Library, in particular its audio-visual aids and Computer-Aided Learning (CAL) modules.

6.4.5 The Committee noted that WMO fellowships continued to be awarded to its Members under the various WMO programmes. In addition, the Committee noted that new applied techniques in tropical cyclone forecasting have resulted in an increasing demand for postgraduates and specialized studies. Therefore, the Committee urged donor Members to arrange for relevant training at all levels to enable personnel from Member countries to utilize more effectively the new technologies.

6.4.6 The Committee expressed appreciation to the Australian Bureau of Meteorology for the Assistant Forecasters Training Course, and noted with satisfaction the positive impact on their NMHSs. The Committee therefore requested that this course should be continued.

6.4.7 The Committee noted that most Members of the Committee would benefit from in-country mentor training whereby a trained specialist would enable a NMHS to make best use of available resources to improve its performance during a tropical cyclone monitoring episode. Therefore, the Committee requested, through the representative of Australia, the Director of the Australian Bureau of Meteorology to provide suitable trainers for this task.

6.4.8 The Committee noted that it would be beneficial for RSMC Nadi and centres that depend on RSMC Nadi for tropical cyclone advisory and/or warning services to be familiar with each other's operations. The Committee therefore requested donor Members to provide support for Members of the Committee to do attachments to RSMC Nadi and vice-versa.

6.4.9 The Committee noted the concerns expressed by Members on the forecasting of wind waves, swells and storm surges. In this connection, the Committee requested the WMO Secretariat to organize a marine meteorology workshop dealing with these aspects.

6.4.10 The Committee welcomed the announcement made by the delegate of the USA regarding the establishment of the Pacific Desk in the US National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) Honolulu Office for training forecasters. The two-months training course is planned to start in early January 2001 and the USA will meet all expenses for the participants. The request for nominations for the training will be issued by the SPREP Secretariat in October 2000.

6.4.11 The Committee noted with appreciation the improvement of training facilities at RSMC Nadi, through the EU funded Cyclone Warning System Upgrade Project. The Committee also welcomed the initiative undertaken by Fiji in requesting Japan to assist the Fiji Meteorological Service in conducting training courses in Fiji. WMO Class III course is scheduled from 7 to 31 May 2001.

6.5 Meteorological research component (agenda item 6.5)

6.5.1 The Committee recalled that the twelfth session of RA V (XII-RAV) Denpasar, September 1998, had invited Members to make full use of the TCP series "Global Guide to Tropical Cyclone Forecasting" (WMO/TD-No. 560) and the "Global Perspectives on Tropical Cyclones" (WMO/TD No. 693) since they provide guidance and information for tropical cyclone forecasters and researchers. In this connection, the Committee noted that the Fourth International Workshop on Tropical Cyclones (IWTC-IV), Haikou, China, April 1998, had recommended an update of the "Global Guide to Tropical Cyclone Forecasting" which will be placed in the World Wide Web for easy access for forecasters. The Committee therefore urged WMO to coordinate the urgent implementation of this recommendation.

6.5.2 The Committee was pleased to note that the CAS Working Group on Tropical Meteorology Research (WGTMR) had submitted a research project on landfalling tropical cyclones to the World Weather Research Programme's (WWRP) Science Steering Committee which approved it. The Committee urged the support of the scientific community for the urgent execution of the project which is expected to impact positively on current tropical cyclone landfalling operational and forecasting capabilities, thereby ensuring improved reduction of the adverse impact of landfalling cyclones in coastal communities. Furthermore, the Committee urged that this research project specifically address impacts of landfalling tropical cyclones on small island nations.

6.5.3 The Committee recalled that the Thirteenth World Meteorological Congress (Cg-XIII) Geneva, May 1999, recognized the importance of scientific research on various aspects of tropical cyclones and encouraged the continued close collaboration between the Tropical Cyclone Programme and the Tropical Meteorology Research Programme. The Committee was pleased to note that the twelfth session of the WMO Commission for Atmospheric Science (CAS-XII) has appointed a Rapporteur on Climate Change Aspects of Tropical Weather Systems and also re-established the CAS Project TC2 (Tropical Cyclone Climate Change Assessment), which is aimed at keeping Members abreast with current state of scientific knowledge on tropical cyclone impact from climate change.

6.5.4 The Committee noted that IWTC-V is scheduled to be held, tentatively in Cairns, Australia, in April 2002. The Committee urged Members to ensure effective participation in the workshop.

6.5.5 The Committee requested WMO and NMHSs involved in tropical cyclone forecasting to give high priority to research into the structure and behaviour of tropical cyclones of small diameter and tropical cyclones (of all sizes!) which race from a minor disturbance to hurricane intensity in less than 24 hours in the hope that more useful warnings might be provided in circumstances that would otherwise lead to unnecessary loss of life and serious damages.

6.5.6 The Committee urged the research community to assess the impacts of tropical cyclones due to the effect of climate change on small island states.

6.5.7 The Committee was informed that a Cyclone Research Cell was established at the RSMC La Réunion – Tropical Cyclone Centre.

6.5.8 The Committee noted the usefulness of seconded scientists to RSMCs to carry out research and exchange of scientific knowledge. The Committee therefore requested donor Members to provide support for this initiative.

7. ASSISTANCE REQUIRED FOR THE IMPLEMENTATION OF THE PROGRAMME FOR THE DEVELOPMENT OF SERVICES (Agenda Item 7)

7.1 The Committee reviewed and noted the information submitted by the Secretary-General presenting a summary of Technical Cooperation Programme activities in the Member countries during the reporting period. The Committee requested the Secretary-General to continue his efforts to seek and secure funding resources from the United Nations Development Programme (UNDP) and other donor agencies and donor countries for the implementation of the Tropical Cyclone Programme (TCP) activities.

7.2 The Committee noted that UNDP continues to provide funding resources directly to the countries for national projects. The Committee urged Directors of NMHSs to tap into this source

of funding by submitting project proposals directly to their UNDP representative with the help of WMO Sub-regional Office if required.

7.3 The Committee noted with appreciation the valuable assistance provided to some Members of the Committee through the EU funded Cyclone Warning System Upgrade Project during the period from 1997 to 2000. The Committee also noted that the project came to end on 15 March 2000.

7.4 The Committee further noted the firm view of the participating countries and territories of the EU funded Cyclone Warning System Upgrade Project that the EU consider allocating further funding sources through the European Development Fund (EDF) to tackle the many areas related to mitigation of tropical cyclone disasters. In this respect, the Committee encouraged Directors of NMHSs to work very closely with their national governments in preparing a project proposal to EU for EDF9 (2002-2003) through their formal national channel. The Committee requested WMO, SPREP, and SOPAC Secretariat to assist Directors of NMHSs in this initiative.

7.5 The Committee expressed its appreciation for the Voluntary Cooperation Programme (VCP) activities, which had been carried out. The Committee further noted that VCP played an effective role in the implementation of the programme activities of this Committee particularly those related to the World Weather Watch (WWW) programme and to the training of personnel through the provision of fellowships.

7.6 The Committee noted that some Member countries received assistance through bilateral and multilateral arrangements for the development and strengthening of their NMHSs. The Committee requested Members to provide the WMO Secretariat with information pertaining to such assistance and to keep the Chairman of the Committee informed to avoid any duplication.

7.7 The Committee expressed its appreciation to Australia, European Union, France, Italy, New Zealand, Peoples' Republic of China, Japan, United Kingdom, and United States of America for their continued support through bilateral and multilateral assistance, and the Committee also welcomed new donor countries such as Finland.

7.8 The Committee was informed of the Memorandum of Understanding (MOU) signed between WMO and SOPAC. In this respect, the Committee urged the WMO Secretariat to coordinate its programme activities with the SOPAC and other regional organizations.

7.9 The Committee expressed its appreciation to the SPREP Secretariat for coordinating the needs analysis carried out under the Pacific Meteorological Service Needs Analysis Projects (PMSNAP). The Committee also expressed its gratitude to the Australian Government through AusAid for providing the funds, and to the Australian Bureau of Meteorology, Fiji Meteorological Service, Météo-France, Meteorological Service of New Zealand Ltd, SPREP, US NOAA NWS Pacific region and WMO for carrying out the needs analysis. The Committee welcomed the projects which have resulted from the needs analysis. The Committee examined the proposals and noted that Projects 1, 2, 3 and 4 are of relevance to the activities of this committee. In this respect, the Committee urged the WMO and SPREP Secretariats to secure funding resources for the implementation of these projects (see Appendix X).

7.10 The Committee was informed of the newly established project under the SOPAC Secretariat Disaster Management Unit having three components, namely, capacity development, warning system (meteorology sub-component and flood sub-component), and working with communities. The Committee urged Directors of NMHSs to liaise very closely with SOPAC national focal points on this newly established project, and also urged SOPAC Secretariat to coordinate the project with the WMO and SPREP Secretariats to avoid any duplication.

7.11 The Committee noted with appreciation the Samoa Post Tropical Cyclone Coordination Meetings and welcomed the outcomes of the meetings (see Appendix XI).

7.12 The Committee welcomed the establishment of the WMO Sub-regional Office for the South-West Pacific in its role of assisting Members countries.

8. DATE AND PLACE OF THE NINTH SESSION (Agenda item 8*)*

8.1 The Committee expressed the need to continue its work in the light of Resolution 6 (XII-RA V). It also expressed the desire that its ninth session be held before the 2002-2003 cyclone season, the precise dates to be determined later.

8.2 The delegates of Niue and of the Solomon Islands informed the Committee that both countries are willing to host the ninth session in 2002. The delegate of Niue presented a letter to the Committee from the Premier's Office of their intention to host. The Committee welcomed these offers and requested the Secretary-General of WMO to take appropriate action, in consultation with the President of RA V and its Chairman, in deciding who will host the session in September/October 2002.

9. CLOSURE OF THE SESSION (Agenda item 9)

The report of the eighth session of the Committee was adopted at its final meeting on 11 September 2000.

LIST OF APPENDICES

APPENDIX I

LIST OF PARTICIPANTS

1. Officers of the session

Chairman	Mr Steve C Ready	(New Zealand)
Vice-chairman	Mr Arona Ngari	(Cook Islands)

2. Representatives of WMO Members

Australia

Mr Len Broadbridge
Australian Bureau of Meteorology
P O Box 1370
West Perth
Western Australia 6872
Tel: (61) 8 92632210 Fax: (61) 8 92632211
Email: l.broadbridge@bom.gov.au

Cook Islands

Mr Arona Ngari
Meteorological Service
P O Box 127
Rarotonga
Cook Islands
Tel: (682) 20603 Fax: (682) 21603
E-mail: angari@met.gov.ck

Fiji

Mr Rajendra Prasad
Meteorological Service
Private mail Bag
Nadi Airport
Fiji
Tel: (679) 724888 Fax: (679) 720430
E-mail: fms@met.gov.fj

Mr Alipate Waqaicelua
Meteorological Service
Private Mail Bag
Nadi Airport
Fiji
Tel: (679) 724888 Fax: (679) 20430
E-mail: Alipate.Waqaicelua@met.gov.fj

French Polynesia

Mr Jacki Pilon
BP 6003
Faa'a Airport
Tahiti
Tel: (689) 803301 Fax: (689) 803 309
E-mail: jacki.pilon@meteo.fr

Indonesia	Mr Sri Diharto Meteorological and Geophysical Agency J1 Angkasa I No. 2 Jakarta Indonesia Tel: (62) 21 424677 Fax: (62) 21 4246703 E-mail: Sridihar2@cbn.net.id
Micronesia, Federated States of	Mr David Aranug Meteorologist-in-Charge PO Box 10 YAP State FSM 96943 Tel: (691) 350 2194 Fax: (691) 350 2246 Mr. Ceasar Hadley Staff Meteorologist FSM Weather Service P O Box 69 Pohnpei, FM 96941 Federated State of Micronesia Tel: (691) 320-2248 Fax: (691) 320-5787 E-mail: ceasar.hadley@noaa.gov
New Caledonia	Mr Yves Bouteloup Météo-France BP 151 98800 Noumea Cedex New Caledonia Tel: (687) 279300 Fax: (687) 279327 E-mail: Yves.Bouteloup@meteo.fr
New Zealand	Mr Steve C Ready Meteorological Service of NZ Ltd 30 Salamanca Rd P O Box 722 Wellington New Zealand Tel: (64) 4 4700 767 Fax: (64) 4 471 2078 E-mail: ready@met.co.nz
Niue	Mr. Sionetasi Pulehetoa Niue Meteorological Service P O Box 82 Alofi Niue Tel: (683) 4600 Fax: (683) 4602 E-mail: sionetasi.pulehetoa@mail.gov.nu

Papua New Guinea	Mr Ken Onno National Weather Service PO Box 1240 Boroko NCD Tel: (675) 3252788/3255544 Fax: (675) 3252740/3255544 E-mail: pngnws@daltron.com.pg
Samoa	Mr Faatoia Malele Samoa Meteorological Division Min of Agriculture, Forest, Fisheries & Met P O Box 3020 Apia Tel: (685) 20855 Fax: (685) 20857 E-mail: f.malele@meteorology.gov.ws
Solomon Islands	Mr Chanel Iroi Solomon Islands Meteorological Service Ministry of Culture, Tourism & Aviation P O Box 21 Honiara Solomon Islands Tel: (677) 21-757 Fax: (677) 20-046 E-mail: c.iroi@met.gov.sb
Tonga	Mr ‘Ofa Fa’anunu Tonga Meteorological Service P O Box 845 Nuku’alofa Tonga Tel: (676) 23401 Fax: (676) 24145 E-mail: tongamet@kalianet.to
United States of America	Mr Richard Hagemeyer Director, NATL Weather Service, Pacific Region 737 Bishop Street # 2200 Honolulu HI 96813-2313 Tel: (1808) 532 6416 Fax: (1808) 532 5569 Email: richard.hagemeyer@noaa.gov Mr Akapo Akapo Warning & Coordination Meteorologist National Weather Service P O Box 789 Pago Pago American Samoa Tel: (684) 699 9130/ 699 4651 Fax: (684) 699 1550 Email: Akapo.Akapo@noaa.gov

Mr James Weyman
Director
Central Pacific Hurricane Centre
National Weather Service Forecast Office
2525 Correa Rd
Suite 250
Honolulu HI 96822
USA
Tel: (1808) 973 5272 Fax: (1808) 973 5271
Email: james.weyman@noaa.gov

Vanuatu

Mr Bae Williams
Vanuatu Meteorological Service
Private Mail Bag 054
Number Two
Port Vila
Vanuatu
Tel: (678) 22932/22331 Fax: (678) 27414/22310
Email: metco@vanuatu.com.vu

3. Non-WMO Members

Kiribati

Mr Tekena Teitiba
Meteorological Service
P O Box 486
Betio
Tarawa
Tel: (686) 26-459 Fax: (686) 26-089
Tel: (686) 26024 Director's Residence
Tel: (686) 26511 Operation Office, Director
E-mail: kirmet@tskl.net.ki

Tuvalu

Ms Hilia Vavae
Director
Meteorological Service
Ministry of Works, Energy and Communications
Private Mail Bag
Funafuti
Tel: (688) 20-736 Fax: (688) 20-090
E-mail: hilia@tuvalu.tv

4. Invited Expert

President of RA V

Dr Lim Joo Tick
Director General
Malaysian Meteorological Service
Jalan Sultan
46667 Petelaing Yaja
Selangor
Malaysia
Tel: (603) 7569422 Fax: (603) 7550964
Email: jtlim@kjc.gov.my

5. Representatives of Regional and International Organizations (Observers)

South Pacific Regional

Environment Programme (SPREP)	Mr Penehuro Lefale SPREP Climatologist PO Box 240 Apia Samoa Tel: (685) 21 929 Fax: (685) 20 231 Email: pene@sprep.org.ws Email: sprep@sprep.org.ws	
South Pacific Applied Geoscience Commission (SOPAC)	Mr Neville Koop PO Box 9533 Nadi Airport Fiji Tel: (679) 651911 Fax: (679) 668882 Email: nlk@is.com.fj	
International Federation of Red Cross & Red Crescent Societies	Mr Abbas Gullet P O Box 2507 Government Buildings Suva Fiji Tel : (679) 311855 Fax: (679) 311406 E-mail: ifrcfj01@ifrc.org	
WMO RAV Working Group on Hydrology	Mr Rishi Raj Chief Hydrologist 11 Totara Street Upper Hutt New Zealand Tel: (64) 4 5288447 Fax: (64) 4 5288447 Email: Rishi_raj5@hotmail.com	
6. WMO Secretariat	Mr Katsuhiro Abe WMO Geneva Switzerland Tel: (41) 22 730 8453 Fax: (41) 22 730 8021 Email: Abe_K@gateway.wmo.ch	
	Mr Henry Taiki WMO Subregional Office for the South-West Pacific Apia Samoa Tel: (685) 28929 Fax : (685) 20231 E-mail: wmo.srop@sprep.org.ws	

7. Interpreters

Ms Elisabeth Auger-Benamar
Australia
Tel: (61) 7 544 91296 Fax: (61) 7 544 91296
E-mail: eliclairauger@bigpond.com

Ms Sabine Bouladon
Australia
Tel: (61) 2 62951511
E-mail: sabinebouladon@dingoblue.com.au

8. Local Observers

Mr Atatoa Herman
Secretary
Ministry of Works, Energy and Physical Planning

Mr Keu Mataroa
Policy Advisor
Ministry of Works, Energy and Physical Planning

Mr John Hosking
Police Department

Ms Nukutau Pokura
Cook Islands Red Cross

Mr Mark Vaikai
Airport Authority

9. Local Secretariat

Ms Twila Reuther
Environment Service

Ms Tania Temata
Environment Service

Mr Maara Vaiimene
Meteorological Service

Mr Vaine Mokoroa
Disaster Management Office
Police Department

Ms Audrey Brown
Ministry of Foreign Affairs & Immigration

Mr Roro Taia
Meteorological Service

Mr Ben Parakoti
Ministry of Works Energy & Physical Planning
(MOWEPP)

APPENDIX II

AGENDA

1. ORGANIZATION OF THE SESSION

    1.1 Opening of the session
    1.2 Adoption of the agenda
    1.3 Election of the vice-chairman
    1.4 Working arrangements of the session

2. REPORT OF THE CHAIRMAN OF THE COMMITTEE

3. COORDINATION WITHIN THE WMO TROPICAL CYCLONE PROGRAMME

4. REVIEW OF THE 1998/1999 AND 1999/2000 CYCLONE SEASONS

5. REVIEW OF THE TROPICAL CYCLONE OPERATIONAL PLAN FOR THE SOUTH PACIFIC AND SOUTH-EAST INDIAN OCEAN

6. FORMULATION OF THE TECHNICAL PLAN AND ITS IMPLEMENTATION PROGRAMME (2001 – 2002)

    6.1 Meteorological component
    6.2 Hydrological component
    6.3 Disaster prevention and preparedness component
    6.4 Training component
    6.5 Meteorological Research component

7. ASSISTANCE REQUIRED FOR THE IMPLEMENTATION OF THE PROGRAMME FOR THE DEVELOPMENT OF SERVICES

8. DATE AND PLACE OF THE NINTH SESSION

9. CLOSURE OF THE SESSION

APPENDIX III

REPORT OF THE CHAIRMAN OF THE COMMITTEE

1. INTRODUCTION

The impact of the crises in both Fiji and the Solomon Islands is likely to be felt for a long time to come. From the point of view of somebody who has both friends and relations in Fiji and has been visiting Fiji almost once a year over the past decade, I thought Fiji was making good progress following the 1987 coups until the latest episode. Amongst the professional staff in RSMC Nadi, only Rajendra Prasad and Alipate Waqaicelua remain from 1987 it's hard to believe there will not be a brain drain following the latest coup and subsequent events. Although there is nothing we can do physically to alleviate the pain faced by our colleagues in Fiji and the Solomon Islands, I'm sure, our moral support and prayers will be appreciated as both countries face very uncertain and difficult times ahead.

In this report, you will find references to the following:

- 1998/1999 and 1999/2000 tropical cyclone seasons;
- EU project which ground to a halt on the 31 March 2000;
- notes and recommendations from various meetings which have a direct effect on the work and decision-making of this committee;
- performance of the Tropical Cyclone Operational Plan;
- retirements and of Paea Havea and Rex Falls, both important and long-serving members of this Committee.

There are already a growing number of issues and recommendations to consider before we even set foot in Rarotonga for the eighth session. Over the last two seasons, we have dealt with issues on when a cyclone is a cyclone, naming (including a case where Elle was on the verge of being used by the Perth TCWC before it (she) was scrapped and replaced by Elaine to avoid possible political repercussions), coordination between Meteorological Centres and problems dealing with midget tropical cyclones. The USA has put forward a proposal to change the definition of "Tropical Cyclone". Before any decision is made, the benefits and drawbacks of such a change will need to be considered carefully to avoid naming a system that is here today and gone tomorrow. What about the special case of a monsoon low that can have storm force winds in one quadrant and gales that don't quite make it around the remainder of the circulation?

Please come to Rarotonga having studied the agenda notes and prepared to discuss the issues that really matter to us.

2. 1998/1999 and 1999/2000 TROPICAL CYCLONE SEASONS

There were a total of 37 tropical cyclones across the area from the southeast Indian Ocean to southeast Pacific - 17 named by Perth TCWC; 12 by Nadi RSMC; six by Brisbane TCWC and two by Darwin TCWC (refer to Tables in the Appendix). About 50% of these cyclones were hurrricanes, including nine major hurricanes and Thelma which crossed the Kimberly coast of Western Australia in December 1998 was considered strongest, with estimated maximum sustained winds of 120 knots. Other cyclones to make landfall around northwest Australia were Vance in March 1999 which devastated the northwest of the town of Exmouth, producing a measured wind gust of 267 km/h which is the highest wind speed ever recorded on mainland Australia; also Gwenda, Ilsa, John, Steve and Rosita. Steve described a very interesting path, journeying from the eastern side of Australia to the western side via the

Gulf of Carpentaria. It lost tropical cyclone intensity three times before making landfall over Shark Bay about 500 kilometres north of Perth, two weeks after starting out as a tropical cyclone in the Coral Sea. At no stage did Steve make hurricane intensity, preferring to stay close to the coast instead of wandering out to the energy-rich open sea. Its influence on the general circulation didn't stop there. Eventually, a depression formerly cyclone Steve entered the sea again over the Great Australia Bight and wound up into a deep mid-latitude storm as it speed away southeastwards to the south of Tasmania on the 13th and 14th of March.

Dani, with estimated maximum sustained winds of 95 knots crossed over northern parts of Vanuatu and was the only major hurricane in the South Pacific. There were three cyclones with double names viz Damien/Birenda, Frederic/Evrina and Leon/Eline. The double-barrelled cyclone name is a consequence of what happens when a tropical cyclone shifts from the Perth to the La Réunion area of responsibility. To ensure a smooth transition from one name to another, La Réunion holds onto two names for 24 hours after the cyclone crosses the boundary at 90°East. After Eline dropped its other name, it passed across Madagascar into Mozambique where the flood situation shifted from serious to calamitous.

There were a few midget or very small diameter tropical cyclones. Iris, one of them kicked off a late start to the 1999/2000 season for the South Pacific when it scraped past the islands of Malekula and Epi, in northern Vanuatu in early January.

Moderate La Niña conditions persisted throughout both cyclone seasons, with cool sea surface temperature anomalies in the central and eastern equatorial Pacific, stronger than normal trade winds and Southern Oscillation index running between 0.9 and 1.8 standard deviations above the mean. The concentration of cyclone activity in the Australian, Vanuatu and New Caledonia areas was obviously a reflection of this background climatology. However, six cyclones did form east of 180°, including Kim which acquired tropical cyclone intensity south of 20°South in the French Polynesia area.

3. EUROPEAN UNION (EU) PROJECT

The EU Project: 7-RPR-458 - CYCLONE WARNING SYSTEM UPGRADE which commenced in late 1996 with Neville Koop as Project Coordinator drew to a close at the end of March 2000. Participating countries including Samoa, Kiribati, Tuvalu, Solomon Islands, Papua New Guinea, Vanuatu, New Caledonia, Fiji, Tonga and French Polynesia have all benefited to a lesser or greater degree from capacity building, various forms of training and the installation of equipment, particularly to do with communications and reception of satellite imagery. Emergency Managers Weather Information Network (EMWIN) units have been made freely available across the South Pacific and enabled national Meteorological Centres and Disaster Management Centres to take quick delivery of tropical cyclone advisories and other weather products via a GOES satellite. EMWIN has become the primary means of delivery for Pacific Island countries that rely on RSMC Nadi for Routine and Special Weather Bulletins. For the foreseeable future, EMWIN will only be able to provide inbound information so a number of countries have been equipped with mini Sat-M units to handle outward data via Inmarsat.

A series of Public Education and Awareness workshops have been completed in Fiji, Tonga, Samoa, Papua New Guinea and Vanuatu. The focus of these workshops has been on improving knowledge of the cyclone warning system at the community level, with the help of educational material, e.g. posters, pamphlets etc in local languages. As a follow up, the Second Training Workshop on Public Weather and Warning Services was held in Nadi in October 1999 to assist meteorological service personnel acquire better skills in relating to the public via the media and improving the response of the community to cyclone warnings.

Although a feasibility study was carried out on installing a number of AWSs across the region, this proposal never reached the implementation phase. I would like to thank the EU for funding the Cyclone Warning System Upgrade project and Neville Koop for the excellent job of coordinating and implementing the various activities.

4. INFORMAL TECHNICAL COORDINATION MEETING IN NADI

In early June 1999, the Fiji Meteorological Service hosted an *ad hoc* Technical Coordination meeting involving delegates from USA (James Weyman, Director, Central Pacific Hurricane Centre and Navy Captain Ty Aldinger, Commanding Officer, Naval Pacific Meteorology and Oceanography Center/JTWC), Fiji (Rajendra Prasad, Director and Alipate Waqaicelua, Manager Forecasting), Steve Ready as Chairman, Joel Martellet, a WMO Code Specialist, Katsuhiro Abe; Chief, Tropical Cyclone Programme, WMO and Fa'atoia Malele, Acting Director, Samoa Meteorological Service. A number of Fiji Meteorological Service forecasters joined the meeting for presentations on CREX (Character for the Representation and Exchange of data) by Joel Martellet and JTWC (Joint Typhoon Warning Centre) by Captain Aldinger. The meeting focussed on code formats, the use of storm identifiers, terminology, the naming of tropical cyclones, coordination of tropical cyclone information from a variety of sources and bilateral arrangements.

Refer to Appendix C for the set of recommendations that emerged from this meeting. Your attention is drawn to recommendations 1 and 3.

5. CORAL SEA REGION TROPICAL CYCLONE COORDINATION MEETING IN BRISBANE

On 4 and 5 November 1999, the Australian Bureau of Meteorology hosted a Coral Sea Region Tropical Cyclone Coordination meeting in Brisbane. It was organised under the auspices of the EU Cyclone Warning System Upgrade Project 7-RPR-458 and supported by WMO via the RA V Tropical Cyclone Committee for the South Pacific and South-East Indian Ocean. The main aim of this meeting was to facilitate dialogue and forge better working relationships among countries with local and international cyclone warning responsibilities in the Coral Sea area. It was not meant to duplicate the work of the Tropical Cyclone Committee or make binding decisions in relation to alterations to the Tropical Cyclone Operational Plan. Representatives from Papua New Guinea, Solomon Islands, Australia, Fiji and New Zealand were present as well as Neville Koop, Project Coordinator who acted as rapporteur for the meeting. Unfortunately, both Vanuatu and New Caledonia, were unable to attend this meeting. Steve Ready, chairman of the RAV Tropical Cyclone Committee acted as the facilitator for this meeting.

As it happened, two of the five recommendations related to changes to the Operational Plan and will be presented at the Eighth Session of the Tropical Cyclone Committee for further discussion.

The following issues figured prominently in the discussions and/or the recommendations of the meeting:

i) 1998/1999 TROPICAL CYCLONE SEASON

A roundup of the season homed in on difficulties in implementing the Operational Plan. Brisbane experienced problems with handling a small, rapidly developing tropical cyclone close to the coast which the regional and global models had trouble mapping with any skill at all. Fiji also found difficulty in assessing the intensity and behaviour of midget tropical cyclones, e.g. Frank and Hali. (A research proposal has been drafted to address these issues.) The timing

of naming a tropical cyclone became a hot issue during the season. There were three cases where tropical cyclones could arguably have been named earlier than they were. There is pressure from affected countries for Tropical Cyclone Warning Centres to make this decision as early as possible to provoke a swifter "stand up and take notice" response and to enable local countries to follow their emergency procedures more efficiently.

ii) TERMINOLOGY

The current definition of TROPICAL CYCLONE in the Operational Plan is general and broad enough to include cyclonic circulations which originate in the tropics (north of 25°South), intensify to storm or marginal hurricane intensity (before reaching 30°South) and do not have the classical look of a tropical cyclone as seen in satellite imagery. At the moment, this breed of cyclone (e.g. 26F in May 1999) is not named but to those caught up in the circulation, the impact is just as devastating as a tropical cyclone and many mariners wonder why it was never given a name. A proposal to name these cyclones will be put to the next session of the RA V/TCC.

iii) COORDINATION BETWEEN VARIOUS CENTRES

The ideal warning is one that encapsulates the distribution of gale force or stronger winds around the cyclone without an adjacent warning centre having to add an extra bit on when copying the original warning to their customers. A proposal encouraging adjacent warning centres to communicate with the primary centre prior to the next warning issue time will be put to the next session of the RA V/TCC for inclusion in the Operational Plan.

Services to Norfolk Island came under scrutiny and highlighted the differences in warning strategies employed by both New Zealand and Australia. As a result of this meeting, New Zealand has decided to adopt the Cyclone Watch/Warning strategy for Norfolk Island which receives all other weather products from Australia.

Refer to Appendix A for the meeting's recommendations.

6. RA I (SOUTHWEST INDIAN OCEAN) TROPICAL CYCLONE COMMITTEE NEWS

Len Broadbridge, the Bureau of Meteorology Regional Director for Western Australia attended the 14th session of the WMO RA I Tropical Cyclone Committee for the South-West Indian Ocean in Quatre Bornes, Mauritius, in September 1999 as an ex officio member. Len was equipped with briefing material from our committee and the following decisions taken at the RA I/TCC meeting will be of interest to us:

i) TROPICAL CYCLONE NAMES

The Committee agreed to use alternating male and female names for tropical storms and cyclones starting in the 1999/2000 season. It also considered whether to retain the names of tropical cyclones moving into the RA I area of responsibility from the Perth zone. It was decided to reconsider this option at its next session.

ii) CRITERIA FOR NAMING CYCLONES IN THE SOUTH-WEST INDIAN OCEAN

After a lengthy debate, the Committee determined that a tropical disturbance would become a named tropical storm when either:

- Wind speeds (10-minute average) reach 34 knots in half of the circulation near the centre or in nearly all of the depression's circulation [If we change the definition of "Tropical Cyclone" in the RA V/TCC Operational Plan, we will need to take a closer look at when a cyclone is baptised with a name];

- or in the absence of objective observations when the disturbance has been classified as 2.5 intensity on the Dvorak scale for six consecutive hours. (The decision to name will be made by one of the two Sub-regional TC Advisory Centres Madagascar if the tropical storm is centred west of 55°E, and Mauritius if it is centred between 55°E and 90°E.).

i) GEOSTATIONARY SATELLITE IMAGERY

At previous meetings the Committee had strongly urged the permanent location of a geostationary satellite over the Indian Ocean by EUMETSAT. It expressed appreciation that EUMETSAT had agreed to extend Meteosat-5 operation at 63°E until the end of 2001. It also reiterated its concern that the utmost be done to permanently overcome the deficiency.

ii) RSMC LA RÉUNION RESEARCH UNIT

The Committee expressed satisfaction with the creation of a Tropical Cyclone Research Cell at RSMC La Réunion; and urged members to take full advantage of the Tropical Cyclone Training Workshops conducted by the Bureau and RSMC La Réunion.

Refer to Appendix B for recommendations to be considered at the eighth session of the RA V/TCC.

7. RSMC TECHNICAL COORDINATION MEETING NEWS

In November 1999, Rajendra Prasad, Director of the Fiji Meteorological Service attended the Third Tropical Cyclone RSMCs Technical Coordination Meeting in Saint Denis, La Réunion. The meeting was attended by experts designated by Tropical Cyclone RSMCs in La Réunion (France), Miami (USA), Nadi (Fiji), New Delhi (India) and Tokyo (Japan). Experts representing the WMO Commission for Atmospheric Sciences (CAS) and the UK Meteorological Office, Bracknell also attended the meeting. The focus of this meeting was on products and services provided by TC RSMCs and other centres with similar functions and how things could be done better.

Some of the outcomes of the meeting were:

i) TROPICAL CYCLONE ADVISORIES

In order to make it quite clear to the international community, particularly the media, who is responsible for the various tropical cyclone advisory information, the meeting requested WMO to advertise that its web site contained links to the five TC RSMC sites. WMO was also asked to prepare a brochure on TC RSMCs as soon as possible.

ii) USE OF INTERNET FOR 1ST LINE COMMUNICATION

In order to cope with the high volume of users during a tropical cyclone episode, the U.S. National Hurricane Center (NHC) set up additional copies of its web-page at four mirror sites. This worked ok until power to the server was knocked out and the flow of the up-to-date information was disabled until the server came to life again.

iii) TROPICAL CYCLONE NAMES

A tropical cyclone should not have several names during its life span and when it tracks from one area or basin of responsibility to another, it should not be renamed.

iv) TERMINOLOGY

The meeting agreed that the following definitions should be used for marine and aviation purposes:

> "tropical depression winds" - up to 33 knots"tropical storm winds" - 34 to 64 knots"hurricane/tropical cyclone/typhoon winds" - 64 knots and above."

v) USE OF "F" AS A DESCRIPTOR FOR TROPICAL DISTURBANCES IN THE FIJI AREA

Rajendra Prasad announced that RSMC Nadi had been given permission during the Expert Meeting on the Evolution of Data Formats in Monterey, California during October 1999 to adopt formally the use of the letter "F" for significant disturbances in its area of responsibility.

vi) TROPICAL METEOROLOGY & TROPICAL CYCLONE FORECASTING COURSES

The USA-sponsored 10-week course on Tropical Meteorology and Tropical Cyclone Forecasting at Miami, USA and open to international participants, has been discontinued. However, the Southern Hemisphere Training Course on Tropical Cyclones conducted biennially at the Bureau of Meteorology in Australia will continue for the next WMO financial period (2000-2003). Although Météo-France and WMO had recently co-sponsored a RA I Training Course on Tropical Cyclones at RSMC La Réunion, there was no budgetary provision for similar courses to be held during the next WMO financial period (2000-2003).

8. Sixth SPREP HEADS OF METEOROLOGICAL SERVICES MEETING NOTES

This meeting was held in Tahiti during July 1999 and the following information has been take from a report by Penehuro Lefale, the SPREP expert on climatological & meteorological matters and the organiser/rapporteur for the meeting.

i) WMO/SPREP RELATIONSHIP

The meeting endorsed the working arrangement between SPREP and WMO in the area of weather and climate for the benefit of Pacific island national Meteorological Services. In the near future, a strategic document will be produced outlining details of the expertise and assets of all countries, regional organisations and collaborating partners engaged in addressing critical meteorological and climate issues in the region.

ii) A METEOROLOGICAL FUND

The meeting was brought up-to-date with the progress made in establishing a special meteorological fund to help serve critical needs in the region and expressed appreciation for the contributions of the United States National Weather Service and the New Zealand Overseas Development Agency who have already provided initial support for the fund.

iii) TRAINING

Mr Richard Hagemeyer, Director of US NOAA NWS, Pacific region, announced a new initiative for building up the capacity of the various SPREP members. The US government is

prepared to sponsor, on a continuing basis, a training program for staff members of the national Meteorological Services at the national Weather Service's Honolulu Forecast Office. While final details have yet to be worked out between SPREP and the WMO RA V Sub-Regional Office, the plan is for officers to undertake a two to four month attachment to the Honolulu Office focussing on skills that can be used or procedures that can be setup once they return to their home country.

iv) FUTURE AID

Once the EU Project comes to an end, the RA V Tropical Cyclone Committee members will be on the lookout for other sources of assistance to face the technological demands of the future. Dr Raino Heino announced that the Finnish Meteorological Institute is interested in supporting Pacific meteorological programs as part of a renewed focus on small island developing states. Dr Heino noted plans for a mission to the region in the year 2000 and highlighted global warming and its consequences as the main focus.

v) SAFFIR-SIMPSON TROPICAL CYCLONE SCALE

Chip Guard, well known in the tropical cyclone community around the world and currently working at the University of Guam revealed that he had completed a document on the adaptation of the Saffir-Simpson Tropical Cyclone Scale for use in all tropical regions. After reading this publication, I am convinced that all Members of the RA V Tropical Cyclone Committee and disaster organisations should hold copies as stock-in-trade. It provides useful information regarding the potential impacts of tropical cyclones on communities, businesses and infrastructure in the pacific region.

9. PERFORMANCE OF THE TROPICAL CYCLONE PLAN

i) USEFULNESS OF TROPICAL CYCLONE ALERTS/WATCHES

I have flogged this issue many times since I became Chairman of this Committee back in 1990 (Has it really been that long!). My philosophy hasn't changed and I believe the issue is probably more valid now than it was back then because we have better resources to tackle the problem. I believe it is better to issue a false alarm than wait for something to happen before doing anything. A warning preceded by no Alert or no useful lead-time is of limited usefulness. During the past two seasons, tropical cyclones Cora, in December 1998 and Mona, March 2000 affected Tonga. In the case of Cora, the 1st Special Weather Bulletin was issued on Christmas Day and like all Sundays, Radio Tonga wasn't on air. A post-cyclone survey conducted by Paea Havea using the form in the Operational Plan revealed that many people relied on the coconut wireless to get the message while some waited until the next day when Radio Tonga was back on air just a few hours before the worst of Cora. While broadcasting hours are an internal problem, perhaps more careful consideration might have led to an Alert being issued on Christmas Eve when communications were in full swing. In the case of Mona, the winds were near gale force before the first Special Weather Bulletin was issued.

ii) WHO HAS THE RIGHT TO NAME A CYCLONE?

I repeat what I wrote in the "Newsletter 1999/No 1" as I believe it is very important. "During the 1998/1999 season, there was an occasion when the name of a tropical cyclone (Ella, in this case) was released into the public arena before RSMC Nadi had officially named it. There was a clash of interests - RSMC Nadi was waiting for more evidence that gales did actually surround the centre and not just part of it while a threatened Pacific Island country wanted to incorporate the name of the impending cyclone into its own Alert/Marine bulletins. These questions arise - should RSMC Nadi have been more prompt in baptising this cyclone? Did the threatened country have a right to use the name before Nadi had officially done so?

The Tropical Cyclone Operation Plan defines "Tropical Cyclone" on PI-5 and in paragraph 2.2.1.1 on PII-5 mentions who is responsible for naming a cyclone in the various sub-areas of the region. If you feel that any of the TCWCs is taking too long over naming a disturbance, please approach

the TCWC directly (by telephone is best!) and don't take the law into your own hands, by prematurely using the name in the public domain.

In the data-sparse South Pacific, observations close to all the action are normally hard to come by. Systematic changes in the satellite imagery are usually the only indicator of how well a disturbance is progressing towards tropical cyclone status. Just like alerts, there is a need for timely naming of tropical cyclones so I encourage all TCWCs to bear this in mind in the future.

The existence of a number of midget (less than 100 km in diameter) tropical cyclones over past two seasons and their tendency to spin-up and spin-down very quickly has been cited as one of the reasons why tropical meteorologists have found it difficult to name a cyclone when it should have been named.

iii) LIAISON BETWEEN NADI AND OTHER METEOROLOGICAL CENTRES

Through the vehicle of the Tropical Cyclone Plan, we are all involved in the tropical cyclone forecasting process to assist TCWCs so that they can do the job to the best of their ability. As a precautionary word, it is important to respect the integrity of other centres when passing on information or suggesting changes. If you have a different opinion on what is happening, please pass on your thoughts by all means but respect the rights of the other centre with primary responsibility for naming cyclones or issuing warnings to make the final decision without any coercion.

iv) COORDINATION BETWEEN AMERICAN SAMOA and INDEPENDENT STATE OF SAMOA

The protocol came into force in time for the start of the 1998/1999-cyclone season. Fortunately, the locations of cyclone developments over the past two seasons have given both countries the necessary breathing space to prepare for the day when a real cyclone threat comes along. Whether it happens sooner or later, a future cyclone impact is inevitable and will provide the ultimate test for a system that has been put in place with the help of the USA NOAA National Weather Service. In the arrangement, RSMC Nadi provides a Special Advisory to Samoa to help with the compiling of any cyclone warning it issues. A report will be brought to the eighth session of the latest Coordination Meeting which was held in early July 2000.

v) BROADCASTING OF TROPICAL CYCLONE INFORMATION ACROSS THE REGION

During the 1998/1999 and 1999/2000 cyclone seasons, Radio Australia joined Radio New Zealand International (RNZI) in receiving and broadcasting Special Weather Bulletins issued by RSMC Nadi for the various Pacific Island Countries viz Cook Islands, Fiji, Futuna, Kiribati, Niue, Tonga, Tuvalu, and Wallis. Radio Australia would also like to receive cyclone alerts/watches and warnings from Papua New Guinea, Solomon Islands and Vanuatu but as yet no progress has been made in achieving this. Although RNZI have made a decision not to staff their office and studio on a routine basis over the weekend, they have procedures in place to broadcast all alerts/watches and warnings whenever a tropical cyclone threatens property, life or limb in a Pacific island country. The duty RNZI broadcaster keeps in regular contact with the Lead Forecaster at the Meteorological Service of New Zealand about any expected tropical cyclone developments in the area from the Coral Sea to French Polynesia. In turn, the Lead Forecaster will advise RNZI whenever a Special Weather Bulletin or a cyclone bulletin series starts up to ensure these important messages are uplifted from their fax or e-mail system.

RETIREMENTS

PAEA HAVEA

After 48 years with the Tonga Meteorological Service, Paea finally gave up his post as Chief Meteorological Officer and his membership on the Tropical Cyclone Committee in early February. After leading us to believe more than once, he wouldn't be around for the next session of the Tropical Cyclone Committee, we became accustomed to see his smiling face back again and again. It's for real this time - we won't see him at Rarotonga. At the time of his retirement, I sent a message on behalf of us all thanking him for his contributions to the work of the Tropical Cyclone Committee over the years and wishing him a long and happy retirement. He was the only one to carry out a post cyclone survey (two in fact!) using the one at the back of the Operational Plan.

REX FALLS

Rex has been an invaluable member of Tropical Cyclone Committee meetings since the 2nd session in Brisbane back in 1987. His contributions have been enormous - always prepared to get involved in discussions and to fill us in on issues that required more background information. He willingly accepted the role of chairing the "Future Development of Services" round-table discussions which always dragged on until a coherent response could be nutted out for all blank spaces. I will certainly miss his support which carried on in between sessions as well. I sent a message to Rex in early July on behalf of this Committee.

VOTE OF THANKS

Special thanks are due to:

Katsuhiro Abe, Chief, WMO Tropical Cyclone Programme, for keeping in regular contact and providing me with helpful advice whenever it was required.

European Union (EU) for tackling weaknesses in the Tropical Cyclone Warning System via the Project which was ably coordinated by Neville Koop.

Meteorological Service of New Zealand, Australian Bureau of Meteorology, USA National Weather Service and SPREP for their continuing support to meteorological services in the region.

Japanese Government for equipping Fiji with a new RSMC building and modern equipment to help it carry out its regional role more efficiently.

Appendix A

CORAL SEA COORDINATION MEETING RECOMMENDATIONS

1. NAMING RIGHTS FOR A SPECIAL BREED OF CYCLONE

Proposal: That the WMO RA V Tropical Cyclone Operational Plan be amended to make it possible for an intense cyclonic circulation of tropical origin to be named from the appropriate tropical cyclone list.

Directed to: 8th SESSION of the RA V Tropical Cyclone Committee for the South Pacific & South-East Indian Ocean in Rarotonga, September/October 2000.

Background: The current definition of TROPICAL CYCLONE in 1.6.2 of the Plan is general and broad enough to include this type of cyclone which usually originates in the tropics (north of 25°South) and intensifies to storm or marginal hurricane intensity before reaching 30°South. This system does not have a classical Central Dense Overcast (CDO) but lies close to the northern edge of an anticyclonically curved cloud shield, usually with evidence of strong convective elements close to the centre. To those caught up in the circulation, the impact is just as devastating as a tropical cyclone and many mariners wonder why it was never given a name. The systems we are targeting are not the common old garden depressions of tropical or subtropical origin but the ones the numerical models blow up into intense cyclones in the subtropics.

Suggested changes to the Tropical Cyclone Operational Plan: In the definition of Tropical Cyclone, change "developing" to "originating". In Chapter 2, section 2.2.1.1 "Naming tropical cyclones" add to the end of the 2nd paragraph - A name maybe assigned to an intense cyclonic circulation which acquires storm force or stronger winds surrounding (or at least half way round?) the centre north of 30°South. While this particular cyclonic circulation satisfies the definition of tropical cyclone in the Plan, it lacks the classical look of a tropical cyclone often observed in satellite imagery (a Central Dense Overcast cloud mass with or without a visible eye, and spiral cloud bands swirling into or around this central cloud system). This variant of a traditional tropical cyclone is more likely to occur outside the normal tropical cyclone season but one could well develop from November to April inclusive.

Comment: A tropical cyclone is normally named at the threshold of gale intensity or early in its life history. In this case, a name would be withheld until there was observational evidence for the scenario depicted in the global models and the cyclone was estimated to possess storm force winds or very likely to do so as per the criteria outlined in the previous paragraph.

2. STUDIES INTO MIDGET and RAPIDLY DEVELOPING TROPICAL CYCLONES

Proposal: That WMO and national Meteorological and Hydrological Services involved in tropical cyclone forecasting give high priority to research into the structure and behaviour of tropical cyclones of small diameter and tropical cyclones (of all sizes!) which race from a minor disturbance to hurricane intensity in less than 24 hours in the hope that more useful warnings might be provided in circumstances that would otherwise lead to unnecessary loss of life and serious damages.

Directed to: WMO Tropical Cyclone Programme, WMO Commission for Atmospheric Sciences (CAS) Tropical Meteorology Research Programme (TMRP), Research Division of Bureau of Meteorology, Australia, WMO 8th Session of the RA V Tropical Cyclone Committee for the South Pacific & South-East Indian Ocean in Rarotonga, September/October 2000.

Background: The meeting acknowledged the problem in achieving satisfactory warning lead times with rapidly developing tropical cyclones e.g. severe tropical cyclone Rona which developed off the North Queensland Coast in February 1999. Rona reached tropical cyclone intensity (Australian category 1) at 1800 UTC 10 February 1999 and hurricane intensity (Australian category 3) 13 hours later at 0700 UTC 11 February 1999. In areas of tropical cyclone origin where there is a paucity of data and more often than not, clusters of populated low-lying islands, accelerated developments put pressure on the Tropical Cyclone Warning System by preventing the issue of warnings with useful lead times. During May 1993, tropical cyclone Adel raced from being an insignificant tropical disturbance to a destuctive tropical cyclone in less than 24 hours and devastated islands in the southeast of Papua New Guinea. The meeting also acknowledged the dangers in applying a Dvorak intensity analysis on baby sized (less than 150 nautical miles in diameter) tropical cyclones.

Action required: Implementation of research projects into rapidly spinning-up tropical cyclones which will lead to the introduction of applied technique(s) into Tropical Cyclone Warning Centres (TCWCs) for the more efficient handling of these special cases.

3. AMDAR TECHNOLOGY

Proposal: That ALL aircraft plying the Coral Sea and the wider South Pacific region be equipped with Aircraft Meteorological Data Relay (AMDAR).

Directed to: via national Meteorological Services to all airline companies who regularly use the Coral Sea and the South Pacific region, donor agencies

Background: AMDAR data is invaluable for obtaining upper level winds near tropical cyclones and for validating cloud drift and water vapour winds. The global models have been observed to produce poor tropical cyclone forecasts in the northern part of the Coral Sea, including Papua New Guinea and Solomon Islands areas. Part of the reason maybe the complex terrain, but the major reason is surely the lack of any radiosonde data in this region. Since the changeover from OMEGA to GPS technology in radiosondes, there has been a reduction in the number of radiosonde flights from two to one per day, or to so many per month or even to none at all mainly due to the cost of the disposable radio transceiver. Other sources of pressure, temperature and humidity information are urgently sought to replace the loss of this upper level information and if possible, augment what was previously available. The AMDAR technology has the capability of recording wind, pressure, temperature and in the near future, humidity information during an aircraft's ascent and descent in addition to what is normally available en route. In essence, it is akin to having a radiosonde on board an aircraft.

4. SHIFT CLOSER TO THE PHILOSOPHY OF ONE INTERNATIONAL MARINE WARNING PER TROPICAL CYCLONE

Proposal: That an addition be made to the WMO RA V Tropical Cyclone Operational Plan to encourage secondary tropical cyclone warning centres* to liaise closely with the primary tropical cyclone warning centre one hour or more before the next warning issue time so that all the relevant information pertaining to that tropical cyclone can be incorporated, if possible into one bulletin.

*SECONDARY TROPICAL CYCLONE WARNING CENTRE is a TCWC whose area is affected by gale force or stronger winds caused by a tropical cyclone or a tropical cyclone interacting with a mid-latitude ridge of high pressure, but who does not have primary responsibility for issuing the cyclone warning at that time.

Directed to: 8th Session of the RA V Tropical Cyclone Committee for the South Pacific & South-East Indian Ocean in Rarotonga, September/October 2000.

Background: Whenever a tropical cyclone affects more than one marine warning area of responsibility, particularly a tropical and mid-latitude area, the circulation of the cyclone normally becomes asymmetrical to the point that the area of gale force winds extends much further away from the centre on its southern side due to the proximity of a mid-latitude ridge of high pressure. A simple symmetrical wind distribution about the centre might not reflect the reality of gales in the mid-latitude area. If the mid-latitude centre e.g. Sydney RFC or Wellington RSMC is able to consult with the primary tropical cyclone warning centre e.g. Brisbane TCWC or RSMC Nadi before the next warning issue time, there is a good chance that a wind distribution satisfactory to both centres can be incorporated into the one warning. In turn, the secondary centre can just copy the latest warning from the primary centre instead of tacking on an additional area of gales to the originator's warning.

Suggested changes to the Tropical Cyclone Operational Plan: In Chapter 2, section 2.1.2 "Forecasts and warnings for the open sea" after the main text and before the footnotes add the following paragraph:

> "Warnings centres without prime responsibility but affected by the tropical cyclone are requested to consult with the primary tropical cyclone warning centre one hour or more before the next warning issue time whenever a tropical cyclone is likely to have a greater influence than the current warning strategy would suggest so that all relevant information pertaining to that tropical cyclone can be incorporated into one bulletin. This is designed to bypass the need for the centre without prime responsibility to add on a separate zone of gale force or stronger winds when issuing a copy of the tropical cyclone warning."

5. TRAINING OPPORTUNITIES

Proposal: That the WMO RA V Tropical Cyclone Committee keep up-to-date with training opportunities available for forecasting and technical staff in the region and actively support the funding of worthy participants by whatever means.

Directed to: 8th Session of the RA V Tropical Cyclone Committee for the South Pacific & South-East Indian Ocean in Rarotonga, September/October 2000.

Training Initiatives:

i) Short term attachments of inexperienced forecasters and technical staff to centres with the experience and relevant expertise;

ii) Add to the list of web sites generated at the 7th Session of the WMO RA V Tropical Cyclone Committee with particular emphasis on those that offer training opportunities for members.

Appendix B

RA I TROPICAL CYCLONE COMMITTEE MEETING RECOMMENDATIONS AFFECTING THE RA V TROPICAL CYCLONE COMMITTEE

i) BOUNDARIES

The RA I Tropical Cyclone Committee requested its Chairman to invite the RA V Tropical Cyclone Committee to consider at its next meeting moving the western limit of the area for which the Perth Tropical Cyclone Warning Centre is responsible for issuing (tropical cyclone) warnings for shipping on the high seas from Longitude 90°E to 95°E. This proposal was sponsored by RSMC La Réunion with the view to standardising the boundaries of areas of operational responsibility for tropical cyclone warnings over the South Indian Ocean with the Global Maritime Distress and Safety System (GMDSS).

ii) NAMES OF TROPICAL CYCLONES

The Committee requested the Chairman to invite the RA V Tropical Cyclone Committee to consider the possibility of establishing a single list of names for use by the different centres responsible for designating tropical storms and cyclones in the whole of the South Indian Ocean in the future.

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Appendix C

INFORMAL TECHNICAL COORDINATION MEETING RECOMMENDATIONS DIRECTED AT RA V TROPICAL CYCLONE COMMITTEE

1. CLARIFICATION OF NAMING RESPONSIBILITY

That the responsibility for naming a tropical cyclone be clarified at the 8th Session of the RA V Tropical Cyclone Committee with a view to making an addition to the text of the Tropical Cyclone Operational Plan.

2. STORM IDENTIFIER

That the next RSMC Technical Coordination meeting in La Réunion considers the following proposal:

> That Storm Identifier regions be defined or redefined and a centre of prime responsibility be assigned for the issuing of each storm identifier, e.g. P=South Pacific Ocean, U=Australia and S=South Indian Ocean, for CBS 2000 approval.

Action: Rajendra Prasad

3. AGENDA ITEMS FOR 6th SPREP HEADS OF METEOROLOGICAL SERVICES MEETING

i) That RA V Tropical Cyclone Committee convenes on an annual basis in the future;

ii) That Bilateral Arrangements be established between RSMC Nadi and Pacific Island meteorological services clearly mapping out the level of service.

Action: Rajendra Prasad.

4. USE OF CEREX CODE

That RSMC Nadi introduce the CEREX format for disseminating tropical cyclone information, commencing during the 1999/2000 hurricane season or as soon as possible.

Action: Rajendra Prasad. To raise at next RSMC Technical Coordination meeting in November 1999.

5. MAINTENANCE OF CLOSE COOPERATION

This meeting acknowledges the close cooperation between RSMC Nadi, JTWC-Pearl Harbour and CPHC-Honolulu and the need to continue this relationship in the future.

Action: RSMC Nadi, JTWC-Pearl Harbour and CPHC-Honolulu.

6. MARINE WORKSHOP

That a very practical and operational marine workshop be organised for all forecasters in the South Pacific area with emphasis put on the following:

- Relating wind to wave heights
- Swells/combined waves
- Accessing swell/combined wave information from different model(s) covering the region.
- Surf forecasting (if it is appropriate!).

Comment: SOPAC have been keeping a database of wave rider buoy information for various Pacific Island countries over the past 10 years or more when such a buoy was stationed for three months or longer in each place.

Action: Marine forecasting issues raised by Fa'atoia Malele, Samoa who stated that fishing was now second to tourism in attracting overseas currency. Recommendation to be passed onto Neville Koop for consideration at the EU project Steering Group committee meeting in Port Moresby, 17-19 August 1999. Also to be recorded in Katsuhiro Abe's end of mission report to WMO.

Appendix D

TROPICAL CYCLONES IN THE SOUTH-EAST INDIAN OCEAN AND SOUTH PACIFIC AREAS

DURING THE 1998/1999 HURRICANE SEASON

ntensity	***TCWC***	***Nov***	***Dec***	***Jan***	***Feb***	***Mar***	***Apr***	***Total by Intensity***
Major Hurricane (> 90 knots)	***DARWIN***		**Thelma, 120kt**			**Vance, 110kt**		
	PERTH					**F/E, 110kt**	**F/E, 110KT**	
	PERTH						**Gwenda, 110kt**	
	NADI			**Dani, 95kt**				**5**
Hurricane	***PERTH***			D/B, 80kt		Elaine, 75kt		
	NADI		Cora, 75kt		Frank, 75kt	Hali, 65kt		**5**
Storm	***PERTH***	Alison, 60kt	Billy, 60kt				Hamish, 55kt	
	NADI				Ella, 55kt			
	BRISBANE			Olinda, 55kt	Rona, 60kt			
	BRISBANE			Pete, 55kt				**7**
Gale	***PERTH***		Cathy, 45kt					
	NADI				Gita#, 45kt			**2**
Monthly Total		1	4	4	4	4	3	20\19

Named on behalf of WELLINGTON
D/B = Damien/Birenda
F/E = Frederic/Evrina

Appendix E

TROPICAL CYCLONES IN THE SOUTH-EAST INDIAN OCEAN AND SOUTH PACIFIC AREAS

DURING 1999/2000 HURRICANE SEASON

Intensity	*TCWC*	*Nov*	*Dec*	*Jan*	*Feb*	*Mar*	*Apr*	*Total by Intensity*
Major Hurricane	***PERTH***		**John, 110kt**			**Norman, 110kt**	**Paul, 110kt**	
(> 90 knots)	***PERTH***						**Rosita, 100kt**	**4**
Hurricane	***PERTH***			Kirrily, 65kt	L/E, 70kt			
	NADI			Iris, 80kt	Kim, 80kt	Mona, 70kt		**5**
Storm	***PERTH***		Ilsa, 55kt			(Steve, 60kt)		
	PERTH					Olga, 55kt		
	NADI			Jo, 60kt		Leo, 50kt		
	BRISBANE				Steve, 50kt		Tessi, 50kt	
	BRISBANE						Vaughan, 60kt	**7**
Gale	***PERTH***				Marcia, 45kt			
	NADI						Neil, 40kt	**2**
Monthly Total		0	2	3	4	5	5	19\18

L/E = Leon/Eline
(Steve, 60 kt) - max wind occurred in PERTH area. Originally named in BRISBANE area.

APPENDIX IV

RSMC NADI 1998/1999 CYCLONE SEASON SUMMARY

(ONLY HARD COPY AVAILABLE)

APPENDIX V

RSMC NADI 1999/2000 CYCLONE SEASON SUMMARY

(ONLY HARD COPY AVAILABLE)

APPENDIX VI

1998 TO 2000 MEMBERS' CYCLONE SEASON REPORTS

TROPICAL CYCLONE SEASON 1998/1999

(Submitted by American Samoa)

(only hard copy available)

APPENDIX VI, p. 2

APPENDIX VI, p. 3

TROPICAL CYCLONE SEASON 1999/2000

(Submitted by American Samoa)

Summary of USA NOAA NWS Weather Service Office Pago Pago, American Samoa

The 1999/2000 tropical cyclone season was a quiet one. Highest warning was a wind advisory.

Marine advisories, i.e., small craft advisories were issued. Marine advisories are not considered part of the tropical cyclone warning system, and are issued for mariners regardless of wind categories over open waters.

It was a hot tropical cyclone season, and a near normal rainfall, though quite variable in rainfall distribution.

**AUSTRALIAN REGION TROPICAL CYCLONE ACTIVITY
SEASONS 1998/1999 AND 1999/2000**

(Submitted by Australia)

(only hard copy available)

TROPICAL CYCLONE SEASON SUMMARY REPORT

(*Submitted by Cook Islands)*

1998/1999 Cyclone Season

Eight tropical cyclones developed in the region for this season and two of these managed to form east of the dateline. Of these two, Cora and Hali, it was tropical cyclone Hali that affected the Southern Cook Islands.

Tropical Cyclone HALI

TC Hali started as a depression northeast of the Southern Cook Islands and moved in a westerly direction. It passed over open seas and only strong and gusty winds were experienced on some of the islands in the group. Although gale force winds were predicted for the forecasts, no damage occurred on any of the islands.

1999/2000 Cyclone Season

Six cyclones occurred in the region. Only two of these cyclones formed east of the dateline. No cyclones affected the Cook Islands during this season.

1998/1999and 1999/2000 TROPICAL CYCLONE SEASON SUMMARY

(Submitted by Fiji)

(only hard copy available)

TROPICAL CYCLONE AND WEATHER PATTERN IN INDONESIA

(Submitted by Indonesia)

By: Sri Diharto
Director General of the Indonesian Meteorological and Geophysical Agency

(only hard copy available)

TROPICAL CYCLONES AFFECTING NEW ZEALAND LAND AREAS AND WELLINGTON OCEANIC WARNING AREA OF RESPONSIBILITY

(Submitted by New Zealand)

(only hard copy available)

TROPICAL CYCLONE SEASON SUMMARY REPORT

(Submitted by Niue)

1998/1999 Cyclone Season

One cyclone namely Cora, for 1998/99 cyclone season have threatened Niue. Cora in December 1998 had caused severe damage to the wharf extension and moderate damage to trees which blocked main roads, although the path of the cyclone was not directly heading towards Niue.

No warnings were issued from the Regional Specialized Meteorological Centre in Nadi, Fiji for a period of 24 hours. The first strong wind warning received from Nadi but the island already feared by the strong winds and high seas.

The Niue Meteorological Service was very disappointed with the lack of response from Nadi to provide early warnings for Niue. Niue Disaster Council raised concerned and requested through the local meteorological office to seek advice and investigate of why the warnings were late, with regards to effects experienced by the local people from tropical cyclone Cora. The matter was reported to Fiji Meteorological Service for investigations but to date no official explanation was received.

Very rough seas experienced during cyclone Cora but storm surge does not cause any aignificant flooding apart from sea sprays to vegetations on coastal areas. Tropical cyclone Frank in February and Hali in March 1999 also caused minor damages to trees.

1999/2000 Cyclone Season

The 1999/2000 tropical cyclone season in Niue was mostly quiet apart from tropical Mona that passed very close to Southern Tonga in March 2000. Mona posed a threat to Niue when the current position was located to the northwest of the island. However, it was later predicted by Nadi for Mona to move more into a south southwest direction. Although Niue was not directly on its path the wind gusting recorded in Niue associated from cyclone Mona was 48 knots or 89 kilometers per hour.

No sign of flooding experienced from heavy rain and storm surge. As noted in the 1998/99 tropical cyclone season sea sprays to vegetations is very common on coastal areas around Niue and especially the villages on the western side of the island.

No loss of life reported in Niue for the two Tropical Cyclone Seasons 1998/1999 and 1999/2000.

TROPICAL CYCLONE SEASON SUMMARY REPORT

(Submitted by Papua New Guinea)

1998/1999 and 1999/2000 Cyclone Seasons

Papua New Guinea's area of responsibility for tropical cyclone warnings extends from 141°E to 160°E. The cyclone watch phase begins at the end of each November to the end of April the following year. The cyclone season proper is from January to March within the watch phase.

It is common knowledge that the impact of La Niña was the major influence over both the 1998/1999 and 1999/2000 cyclone seasons over the southwest Pacific region. Theoretically, La Niña is expected to be associated with increased probability of both tropical cyclogenesis and tracking into any area of responsibility after forming elsewhere.

Contrary to the above that did not appear to be the case in Papua New Guinea's area of responsibility. With an average of 0.9 cyclone per season, probably the lowest, no cyclones either formed within our area or tracked in from outside our area of responsibility during the two seasons.

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(Available in French only)

RAPPORT SUR LES SAISONS CYCLONIQUES 1998/1999 ET 1999/2000

(Soumis par la Polynesie française)

(only hard copy available)

TROPICAL CYCLONE SUMMARY

(Submitted by Tonga)

(only hard copy available)

1998/1999 and 1999/2000 TROPICAL CYCLONE SEASON SUMMARY

(Submitted by Tuvalu)

(only hard copy available)

1998/1999 and 1999/2000 TROPICAL CYCLONE SEASON SUMMARY

(Submitted by Vanuatu)

(only hard copy available)

APPENDIX VII

NEW TECHNICAL PLAN AND ITS IMPLEMENTATION PROGRAMME
(2001 – 2002)

Items	Priority Rating	Objectives	Strategies	Key Stakeholders	Funding Sources	Remarks
Agreements on products and services between RSMC Nadi[1] and Pacific Island Countries	1	To establish formal agreement between RSMC Nadi and Cook Islands, Samoa, Tokelau, Tonga, Tuvalu, Kiribati, Vanuatu, Niue and New Caledonia (Wallis and Futuna)	To organize bilateral discussions	RSMC Nadi, Cook Islands, Samoa, Tokelau, Tonga, Tuvalu, Kiribati, Vanuatu, Niue and New Caledonia (Wallis and Futuna)		Coordinated by WMO[2] and SPREP[3]
Automatic Weather Stations (AWSs)	2	To restore existing AWSs to full operation; and Develop plans for expanding AWS network.	i) To develop capacity to maintain and sustain operation of AWSs; ii) To seek approval for satellite communication slots from 2003 onwards.	All countries[4], SPREP, and SOPAC[5]	SPREP, SOPAC, and the PMSNAP[6] Projects 1.2 and 2.1	SPREP, WMO and SOPAC prepare project document for EDF9[7] French Polynesia offered to host an AWS maintenance course

[1] RSMC Nadi = Regional Specialized Meteorological Center, specialized in tropical cyclones, located in Nadi, Fiji
[2] WMO = World Meteorological Organization
[3] SPREP = South Pacific Regional Environment Programme
[4] All countries refer to all Pacific island countries and territories, Australia, United Kingdom, France, New Zealand, and USA
[5] SOPAC = South Pacific Applied Geoscience Commission
[6] PMSNAP = Pacific Meteorological Services Needs Analysis Project funded by AusAid to do a need analysis of 21 Pacific island countries. Project proposals were developed from the needs analysis refer to these projects in Attachment A.
[7] EDF9 = European Union Development Fund – Phase 9

Items	Priority Rating	Objectives	Strategies	Key Stakeholders	Funding Sources	Remarks
Mentor Training	3	To provide meteorological training for 2 to 3 nations for 2 to 3 weeks per year	Australia Representative to explore the initiative with his Director	Bureau of Meteorology of Australia, and all Pacific island countries	Australia	
Research	4	To better understand and improve forecasting of midget and rapidly developing TCs	i) To raise in research communities via CAS/ TMRP; ii) To develop climatology - Nadi-Brisbane to collaborate; iii) To review available literature; iv) To raise at IWTC-V.	All countries for (i), (iii) and (iv) Australia and Fiji for (ii)		i) Australia, New Zealand and USA to source available information; ii) Report to RA V/TCC at a future meeting.
Attachment training	5	To familiarize forecasters with RSMC Nadi, Brisbane and Honolulu tropical cyclone warning operations and procedures	To place forecasters from Pacific island countries at RSMC Nadi, Brisbane and Honolulu and vice versa	All countries	WMO, SPREP, USA and Australia	Coordinated by WMO and SPREP
Marine meteorology workshop	6	To improve knowledge of forecasters on the role of ocean in operational forecasting	To conduct a workshop in 2001 and follow up on PMSNAP Project 3.2	All countries		Coordinated by WMO and SPREP

Items	Priority Rating	Objectives	Strategies	Key Stakeholders	Funding Sources	Remarks
Web access to information on wave models	7	To identify information on sources of wave forecasting	To gain access to information on wave forecasting on the Web/MWIN		Australia, USA, and WMO (ECMWF)[8]	To facilitate access to information
Training the trainers	8	To train key staff to enable them to train their staff in tropical cyclone forecasting	To follow up PMSNAP Project 3.1.4 and to identify trainers to be trained at the southern hemisphere tropical cyclone workshop in 2002	All countries	WMO	WMO and SPREP to follow up on PMSNAP Project 3.1.4
AMDAR[9]/ ACARS[10]	9	To expand to other national airlines	Australia to provide information and then countries to approach national airlines	Papua New Guinea, Solomon Islands, Vanuatu, Fiji and Samoa		
Pacific – HYCOS[11]	10	To create flood forecasting and warning systems, and to determine water quality and quantity particularly in small island countries, e.g. Tuvalu	To complete Pacific – HYCOS document, secure funding resources and commence the activity	WMO, SOPAC, American Samoa, Papua New Guinea, Vanuatu, Solomon Islands, French Polynesia, New Caledonia and Federated States of Micronesia, and Tuvalu		Coordinated by WMO and SOPAC

[8] ECMWF **=** European Centre for Medium Range Forecasting
[9] AMDAR = Aircraft Meteorological Data Relay
[10] ACARS = Aircraft ***(Expand the abbreviation and explain what is acars)***
[11] HYCOS – Hydrological Cycle Observing System

Items	Priority Rating	Objectives	Strategies	Key Stakeholders	Funding Sources	Remarks
Naming of special breed of cyclone	11	To improve warning effectiveness	To determine criteria/means/ suitable procedures for naming these “bomb” systems of tropical origin but subtropical intensification	Australia and New Zealand		Coordinated by New Zealand
Fifth International Workshop on Tropical Cyclones (IWTC-V), tentatively Cairns, Australia in April 2002	12	To improve knowledge of tropical cyclone forecasters in the Pacific region	To secure funding for participants from NMHSs in the RA V/TCC area	All countries		Coordinated by WMO, SPREP and Australia
WMO Publications	13	To keep tropical cyclone forecasters up-to-date on tropical cyclone and warning systems	To identify relevant publications and their sources	All countries	WMO	WMO
CROP[12] agencies, SOPAC and SPREP liaison	14	To improve public education and awareness	Each NMHS to empower responsibility of public education to an officer, officer to liaise with national disaster management officers, CROP agencies particularly	All countries, SOPAC, SPREP, and WMO Public Weather Service programme	SOPAC and WMO	Coordinated by Directors of NMHSs, SOPAC, SPREP and WMO

[12] CROP is Council of Regional Organization Programmes and the Members are the Forum Secretariat, the South Pacific Community (SPC), SPREP, SOPAC, the University of the South Pacific (USP), and Forum Fisheries Agency (FFA).

Items	Priority Rating	Objectives	Strategies	Key Stakeholders	Funding Sources	Remarks
			SOPAC and SPREP			
WMO header on GTS messages	15	To enable tropical cyclone warnings to be broadcasted on Radio New Zealand International and Radio Australia, and EMWIN systems	Papua New Guinea and Vanuatu to add WMO header to their tropical cyclone warning messages	Papua New Guinea and Vanuatu		Coordinated by New Zealand, Australia and WMO
Satellite telephones	16	To make these phones operational	To determine causes of problems, determine cost of cards, and purchase 22 cards			Coordinated by WMO

APPENDIX VIII

SATELLITE STATUS REPORTS APPLICABLE FOR THE RA V REGION

Space Segment

The following information is a status report for the space-based sub-system of the GOS. The various status reports were prepared by the satellite operators.

1. CHINA, PEOPLE'S REPUBLIC OF

FY-2 Geostationary Meteorological Satellite

1.1 China launched its first FY-2 satellite, FY-2A, on 10 June 1997 with the Long March-3 vehicle from the Xi Chang Satellite Launching Center. The satellite has been located at the equator at 105^{o}E since 17 June 1997. It acquired its first visible image on 21 June 1997, both first infrared and water vapour image on 13 July 1997.

1.2 Ten months after the launch of the satellite, the S-band antenna of FY-2A could not point at the Earth due to the defect of de-spin subsystem. From 8 April 1998, FY-2A operation was interrupted and the image broadcast was interrupted. To recover the antenna subsystem, a lot of experience has been gained. From July 1998, the FY-2A has been working discontinuously. On 15 December 1998, FY-2A restarted to transmit S-VISSR data in UTC 03:00, 04:00, 05:00, 06:00, 07:00 and 08:00 daily.

1.3 FY-2 satellite data is open for international users. Satellite data can be shared with other countries. User stations covered by FY-2 can receive S-VISSR high resolution digital data and WEFAX low resolution analogue data. FY-2 S-VISSR images are being disseminated by Internet. The FY-2 programme and disseminated images can be accessed by http://nsmc.cma.gov.cn.

1.4 The second FY-2 satellite, named FY-2B, is being constructed and integrated. It is expected to be launched in the year of 2000. The main specifications of the second FY-2 satellite are same as those of the first one.

FY-1C/D Polar Orbiting Meteorological Satellite

1.5 FY-1C/D is a hexahedron of 1.42 x 1.42 x 1.20m. The total length of the satellite is 10.556m when the solar cell arrays stretch out. The height of the satellite is 2.115m and the weight of it is 950kg. The average power of the satellite is 256W.

Functions of the satellite

1.6 The main functions of the FY-1 meteorological satellite are as follows:

- To acquire global surface and cloud images day and night, and to measure surface and cloud top temperatures;
- To measure composition of the space particle near the satellite orbit and to provide space environmental parameters;
- To disseminate the observed data such as HRPT, DPT.

1.7 The satellite carries:

- Two 10-channel VIS/IR scanning radiometers working in a mutual back-up mode, they can be switched according to the tele-command;
- A cosmic component monitor which transmits space environmental monitoring data to the ground through the telemetry system;
- A two-frequency transmitter used to detect satellite motion orbit and to be used as the telemetry transmitter.

Satellite specifications

1.8 FY-1C/D satellite specifications are shown in Table 1.

Table 1

FY-1C/D Satellite Specifications

Altitude	three-axis stabilized
Orbit	sun-syn.
Orbital height	870 km
Orbital period	102.3min
Orbital inclination	98.80
Eccentricity	0.005
Descending mode	8:35 ~ 9:00 (LST)

FY-1 Ground application facilities

1.9 The ground segment consists of a Satellite Control system and a Satellite Data Application system. The Satellite Control system is under the management of Xian Satellite Control Center. It carries out the satellite command and control. The ground application facilities is under the management of the National Satellite Meteorological Center of China Meteorological Administration. It is composed of a Data Processing Center (DPC) in the National Satellite Meteorological Center and three ground stations (DAS) located in Beijing, Guangzhou and Urumqi respectively. The data received by the ground stations are transmitted to the Data Processing Center in real-time through communication satellite and the microwave/optical fibril link. A direct read out service is provided to the users. The raw data and the products are archived on digital tapes. The image and other types of operational products are broadcast to the public through CCTV and a dedicated communication network. Users can obtain these meteorological products via on-line terminal or receiving equipment.

1.10 The data processing of FY-1 satellite is composed of two parts: pre-processing and processing.

1.11 Data pre-processing includes raw data classification, quality control, format conversion, geographical location and calibration. The geographical location is to fit the geographical longitude and latitude on the image with the satellite attitude information, while the

calibration is to decide the accurate radiative equivalent from the output data of the satellite sensor. After the geographical location and the calibration, the pre-processed data set is then archived.

1.12 The data processing can be divided into two types: image processing and meteorological parameter processing. The image processing is to make the projection conversion, mosaic, enhancement and channels composition. The meteorological parameter processing is to derive the physical parameter of atmosphere and land surface, such as out-going long radiation, cloud parameters, vegetation index, sea ice, ocean colour, land surface features and snow cover, from the satellite radiative information with quantitative methods.

Data transmission of FY-1 C/D

1.13 The High Resolution Picture Transmission of FY-1 C and D is named CHRPT. Besides CHRPT there is a Delayed Picture Transmission (CDPT) to acquire 4 channel global image data with 4 km resolution. CHRPT will be disseminated all over the world and CDPT will be only received by China.

1.14 The transmission characteristics of CHRPT are as follows:

- The transmission frequency of CHRPT: 1700.5 MHz and 1704.5 MHz as back-up
- (The transmission frequency of CDPT: 1708.5 MHz and 1695.5 MHz as back-up)
- EIRP: 39.4dbm
- Polarization: right hand circular
- Modulation: PCM-PSK
- Modulation index: 67.5° ± 7.5°
- Bit rate: 1.3308 Mbps

There is no APT transmission for FY-1C

2. JAPAN METEOROLOGICAL AGENCY

2.1 The Japan Meteorological Agency (JMA) operates and develops the Geostationary Meteorological Satellite (GMS) Series. The status of the GMS series and future plans are described below.

Operational satellite

2.2 JMA operates GMS-5 at 140°E above the equator. GMS-5 was launched on 18 March 1995, and put into operation on 13 June 1995 as the successor to the GMS-4. Spectral bands of sensors onboard GMS-5 are summarized in Table 2.

Table 2
Spectral Bands of GMS-5

Sensor	GMS-5
Visible	0.55-0.90
Infrared (thermal)	10.5-11.5
	11.5-12.5
Infrared (water vapour)	6.5-7.0
	(unit: micrometer)

Products of GMS-5

S-VISSR

2.3 Digital images of the full disk with the same resolution as the original imagery are disseminated to Medium-scale Data Utilization Stations (MDUS) users as shown in Table 3.

Table 3
Dissemination of S-VISSR images

Band	Resolution at SSP	Frequency of observation
Visible	1.25 km	Hourly
Infrared (thermal)	5 km	Hourly
Infrared (water vapour)	5 km	Hourly

WEFAX

2.4 Analogue facsimile images with coastal lines and latitude/longitude lines are disseminated for Small-scale Data Utilization Stations (SDUS) users as shown in Table 4.

Table 4
Dissemination of WEFAX images

Type of picture	Type of image	Spatial resolution	Frequency
Four-sectored full disk	IR	8.4 km (at SSP)	three-hourly
Picture	WV	8.4 km (at SSP)	12-hourly
Polar-stereographic	IR	7.2 km (around Japan)	hourly
picture around Japan	VIS	7.2 km (around Japan)	hourly (daytime)
	Enhanced IR	7.2 km (around Japan)	hourly (nighttime)

Other products

2.5 In addition to the direct dissemination of imagery, JMA retrieves the following products from imagery data and disseminates them to users concerned as shown in Table 5.

Table 5
Distribution of the other products

[Available on the GTS]

Type of data	Description	Region of interest	Output frequency
Cloud/Water Vapour motion vectors	Cloud/Water Vapour motion wind vectors data derived from time-sequential images	50 °N-49 °S, 90 °E-171 °W	00Z,06Z,12Z,18Z: four times / day
Typhoon analysis report (SAREP)	Location and Velocity of movement of the typhoon center (Special hourly observation)	For typhoons in EQ-60 °N, 100 °E-180 °	eight times/day (24 times / day)
	Estimation of the typhoon intensity	For typhoons in EQ-60 °N, 100 °E-180 °	four times / day

[For WMO/WCRP]

Type of data	Description	Region of interest	Output frequency
ISCCP data (AC data)	Original VISSR for inter-calibration between images from different geostationary satellites	2000 x 2000 km (Area selected by the Satellite Calibration Centre in France)	five times / month
ISCCP data (B1 and B2 data)	Nominally 10km spatial resolution full disk data for B1 data, 30km for B2 data	Full Disk coverage	eight times / day
GPCP data	Three-hourly histogram of TBB in 24 classes on 1 °x 1 ° grids	40 °N-40 °S, 90 °E-170 °W	eight times / day

2.6 In addition, some products such as cloud amount data, are provided for domestic users.

Data Collection System

2.7 GMS-5 is equipped with the Data Collection System (DCS) to collect meteorological observations from remote stations, ships and aircraft.

2.8 As of December 1998, 187 stations are registered as regional data collection platforms and 290 stations are registered as international data collection platforms, respectively.

2.9 The DCS of the GMS-5 is used to relay emergency information on tsunamis and seismic intensity data.

Multi-functional Transport Satellite (MTSAT)

2.10 The first Multi-functional Transport Satellite (MTSAT), which will be operated as the successor to GMS-5, has the meteorological mission and the air traffic control mission. JMA, in cooperation with the Civil Aviation Bureau of the Ministry of Transport, has plans to launch the MTSAT that will be put into a geostationary orbit at 140 ^{o}E above the equator. MTSAT series is currently planned to be launched every five years thereafter. The designed lifetime of MTSAT is five years for the meteorological mission and ten years for the air traffic control mission.

2.11 MTSAT is a three-axis stabilized satellite. The specifications of MTSAT are shown in Table 6.

Table 6
Specifications of MTSAT

Designed life time:	More than five years (meteorological mission) More than ten years (air traffic control mission)
Orbital position:	Geostationary orbit at 140 ^{o}E above the equator
Imaging period:	Within 27.5 minutes to take a full-disk image
Imager characteristics:	Wavelength Visible 0.55 - 0.80 IR1 10.3 – 11.3 IR2 11.5 – 12.5 IR3 6.5 - 7.0 IR4 (new) 3.5 - 4.0 (unit: micrometer)
Signal quantization:	10 bits for both Visible and IR channels
Resolution at sub-satellite point:	1 km for Visible and 4 km for IR
Imager data transmission rate:	2.62 Mbps
Telecommunication functions:	- Transmission of original image data; - Relay of High Resolution Imager Data (HiRID), whose format is compatible with S-VISSR of GMS with the horizontal resolution of 1.25 km (VIS) and 5 km (IR); - Relay of Low Rate Information Transmission (LRIT) signal including selected imager data, gridded numerical weather prediction products, surface, upper-air and satellite observations, and RSMC Tropical Cyclone Advisories; - Relay of WEFAX signal until March 2003; - Relay of DCP reports from remote stations, aircraft, ships buoys, etc.; - Relay of DCP interrogation.

2.12 MTSAT-1R is scheduled to be launched in the fiscal year 2002.

3. Russian Federation (Russian Federal Service for Hydrometeorological and Environmental Monitoring (ROSHYDROMET)

3.1 The METEOR-3M system is an update of recently operated METEOR-2 (24 satellites were launched) and METEOR-3 (7 satellites were launched) systems.

3.2 One or two satellites will be in orbit and operational at any one time.

3.3 The data received at each regional centre are transmitted to SRC PLANETA in Moscow via telecommunication links. The products derived and orbital parameters of the satellites are distributed by SRC PLANETA via the GTS and widespread networks of various communication channels (including a link through the satellite) enabling a reliable and operational transmission of information to the users and facilitating the access to real-time data.

3.4 The first satellite METEOR-3M No. 1 is planned to be launched in 2000.

3.5 OKEAN-01 No. 7 satellite continues to support the operational oceanographic mission, providing environmental observations, radar and passive microwave data. The Arctic and Antarctic regions are observed regularly to allow an operational monitoring of the marine ice conditions.

3.6 In July 1998, RESURS-01 No. 4 satellite was launched to support RESURS mission. Together with traditional instruments a set of meteorological parameters measuring systems were installed onto this satellite: MR-900, RMK-M, NINA SCARAB and ISP-2.

4. NOAA Polar-Orbiting Satellites

4.1 The Polar Operational Environmental Satellite (POES) constellation includes two primary, two secondary and one standby spacecraft. The primary operational spacecraft, NOAA-14 and NOAA-15 are in sun-synchronous afternoon and morning orbits, respectively. Two secondary spacecraft, NOAA-11 and NOAA-12, provide additional payload operational data, while the standby spacecraft, NOAA-10, supports minimal SAR functions and is only contacted once a week. The current DMSP constellation consists of two primary, two secondary and one back-up operational spacecraft. While the direct broadcast of the DMSP satellites is encrypted, the data are available in near-real time from NOAA. The DMSP-F15 spacecraft was launch in December 1999.

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APPENDIX VIII, pages 8 to 14

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APPENDIX IX

REPORT ON RSMC NADI ACTIVITIES SINCE TCC 7TH SESSION IN SEPTEMBER 1998

1. Introduction

The Regional Specialized Meteorological Centre Nadi - Tropical Cyclone Centre (RSMC NADI-TCC) was formally designated by the WMO Executive Council in May 1995. Following the completion of a grant-in-aid project by the Government of Japan, for the upgrading of its meteorological observations and forecasting systems in early 1998, RSMC Nadi-TCC commenced operations from its new premises on April 1st, 1998.

RSMC Nadi is now fully equipped and staffed by local personnel to serve its designated functions. It utilises 12 WMO Class I and four WMO Class II meteorologists who team up to provide daily weather forecasts and cyclone warning services as warranted for countries in its designated area of responsibility. The operations of RSMC Nadi are centred on the Fiji Integrated Meteorological System (FIMS), which is largely based on the Australian Integrated Forecast System (developed by the Australian Bureau of Meteorology.

RSMC Nadi has submitted two progress reports to the WMO Commission for Basic Systems (CBS 1996 & CBS-Ext.1998) since its initial designation in 1995. CBS is now satisfied of the Centre's facilities and capabilities, and not asked for any further reports.

2. Summary of Activities

2.1 Tropical Cyclone Warning and Advisory Service

In the 1998/1999 Cyclone Season, RSMC Nadi identified and monitored 28 significant tropical disturbances in its area of responsibility, which were then assigned numbers (in the series 01F, 02F…..etc) for identification and inventory purposes. Out of the 28 disturbances, five attained tropical cyclone status in the RSMC Nadi area of responsibility and one in the RSMC Wellington area of responsibility. Two cyclones were named by Brisbane TCWC before they moved into Nadi's area, thus raising the latters total number of cyclones to seven. Four of these seven cyclones in the RSMC Nadi area attained hurricane intensity.

In the 1999/2000 Season, 24 tropical disturbances were identified and monitored. Six of these developed into tropical cyclones of which four reached hurricane intensity.

RSMC Nadi provided regular forecasts, warnings, advisories and summaries on all significant tropical disturbances and cyclones in its area. Tropical Disturbance Advisories were issued four times daily on named cyclones and other systems having potential for development while Tropical Disturbance Summaries were issued twice daily as per established requirements specified in the Tropical Cyclone Operational Plan for region.

Seasonal cyclone summaries and individual reports of tropical cyclones were completed and are available upon request.

2.2 Coordination Meetings

2.2.1 Coordination Meetings within RSMC Nadi Area

RSMC Nadi was actively engaged in coordination meetings, one with American Samoa, Independent Samoa and the US NWS Honolulu, and the other with the Bureau of Meteorology, MetService NZ Ltd and the countries in the Coral Sea region. These meetings essentially explored ways and means of optimising the warning system, strengthening cooperation and

coordination among regional countries and warning centres, and capacity building especially at the national level.

2.2.2 Third TC RSMC Technical Coordination Meeting

RSMC Nadi was represented at the 3rd RSMC Technical Coordination Meeting held at RSMC La Réunion in November 1999. The aim of the meting was to discuss the output of the RSMCs with a view to coordinating and streamlining certain operational and technical aspects of TC forecasting and advisory services across various regions of the world. The meeting agreed to a minimum of information that a TC RSMC should publish when a TC was active in its area. The meeting also noted that some ocean basins are still not covered within the area of responsibility of a designated TC RSMC. It therefore recommended that WMO investigate the possibility of either assigning one or more new TC RSMCs to cover these basins, or to expand the areas of responsibility of existing TC RSMCs concerned. The meeting further noted that functions of the TC RSMCs were significantly different basin by basin, in particular with respect to their operational monitoring systems which were set up by the respective regional tropical cyclone bodies. Nevertheless, the meeting recognized the desire of harmonization of functions of all TC RSMCs. In this regard, the meeting provided the following recommendations in connection with the naming system of tropical cyclones to the regional tropical cyclone bodies concerned :

a) A tropical cyclone should not have several names during its life. When it tracks from one area of responsibility or basin to another, it should not be renamed;

b) The TC RSMCs should have the responsibility of naming tropical systems, from the agreed list regionally. This is a natural part of the operational monitoring and development of products disseminated by TC RSMCs. The TC RSMCs should be open to consultation by Members of the regional tropical cyclone bodies.

2.2.3 Implementation Coordination Meeting on the GTS in WMO RA V

A representative from RSMC Nadi also attended the above-mentioned meeting held in Noumea, New Caledonia from 7 to 10 December 1999. Main recommendations relating to improved communications for RSMC Nadi included:

a) Upgrading of 9.6kbps Nadi-Melbourne GTS link to 32-64kbps Frame Relay Network, which will greatly improve information flow and has proven to be very reliable and cost effective;

b) The ISCS/WAFS receiving system for Fiji to be installed as soon as possible to receive US WAFS broadcasts via satellite rather than the existing cable link to Australia;

c) RA V GTS Implementation Plan includes inter-regional circuit Nadi-Washington which would be ideal for inserting RSMC Nadi products into the ISCS/WAFS and EMWIN. An *ad hoc* group has been established to coordinate the information to be transmitted on the two systems;

d) Use of Inmarsat Mini Satellite terminal to serve as backup to the Nadi-Melbourne GTS link.

2.3 Training

2.3.1 Exchange/Attachments of Professional Personnel

RSMC Nadi hosted regional forecasters on short attachments, for periods up to a fortnight. Two assistant forecasters from Vanuatu and one from Samoa were attached to the RSMC during 1999. A forecaster from French Polynesia is expected soon. The primary objective has been to familiarise personnel on operational aspects of the RSMC and generation of forecasts and warning products for the individual countries. All professionals who participated in this scheme so far have found the attachment to be extremely beneficial and recommended that it should be carried out on as regular basis in future. RSMC Nadi personnel also believe that they can equally benefit from this exercise and should also take short attachments to other NMSs and TCWCs in the region to broaden the knowledge and forecasting skills

2.4 RSMC Nadi Internal Activities

2.4.1 Fiji Integrated Meteorological System (FIMS)

FIMS is a complete meteorological system, comprising data collection, message switching, data display and analysis, forecast preparation and product delivery. It has an integrated graphical workstation-based system, comprising computer and communications hardware, satellite reception facilities and customised software. It automates many meteorological functions, thus allowing forecasters to focus more on actual forecasting, instead of performing repetitive tasks manually. It also alerts all system users to any unusual events, ranging from impending severe weather to system maintenance tasks. This allows users to concentrate on their specialised tasks without fear of missing vital information.

FIMS has significantly assisted forecasters make more timely and accurate forecasts and warnings since being commissioned. Upgrades to a number of applications have improved capability of the RSMC to process and analyse data, including numerical models. Early in 2000, the Pilot Briefing Offices at Nadi and Nausori Airports and the Regional Branch Office in Suva were all connected to the FMS wide area network, thus enabling them access to all data and products available through FIMS. This effectively widened and lifted the overall services of the RSMC, in the aviation, public and maritime sectors.

2.4.2 Communications

Data collection from, and product transmission to, domestic and international clients is via TCP/IP and X.25 interfaces, facsimile, public telephone systems and the Internet. It features full automation, open-systems philosophy with the flexibility to meet future requirements and new technologies, and high expansion capability. The input formats provide for the Global Telecommunications System (GTS), the Aeronautical Fixed Telecommunications Network (AFTN), satellite ingestion systems, and automatic weather station data, and FTP (File Transfer Protocol), while output format includes GTS, AFTN, facsimile, electronic mail, and HTML (Internet web).

Nadi-Melbourne GTS Link **- RSMC Nadi-TCC now has full access to data and products available on the GTS, and at the same time allowing it to provide direct input to this global network. The 9.6 kbps link is being upgraded to 32-64 kbps Frame Relay Service right now, which to greatly improve flow of traffic on this link.**

AFTN Link- RSMC Nadi is still connected to the AFTN through a dedicated circuit to the Nadi Communications Centre, operated by the Airports Fiji Limited, formerly the Civil Aviation Authority of Fiji. This allows meteorological data to be received from countries that still rely on

AFTN (though with a very poor performance record), and at the same time enables warning and forecast products to be disseminated to most of the small island countries in the region.

EMWIN System - ***EMWIN has proven to be an ideal system for broadcasts of weather forecasts and warnings from RSMC Nadi. When the Internet, AFTN and phone/fax lines were out of service in certain regional countries, EMWIN continued to provide the necessary service. It is hoped that the developers can configure the system to be able to transmit data and products in the very near future.***

Internet Access - FMS has been operating a Web Site on the Internet since 22 June 1998 carrying all RSMC Nadi forecasts, warnings and advisory information. Since then, the site has gradually gained popularity among local and international customers, especially during severe weather incidents, and particularly with tropical cyclones. During the 98/99 Season, RSMC Nadi started posting active cyclone tracks on the web. This particular service is still at an experimental stage but it is hoped that a more, user-friendlier version will be available soon. Also available is weather radar loops, satellite imagery (animation will be available soon), climate information on Fiji and contacts of key FMS staff. The URL for the Web Site is **http://www.met.gov.fj.** The recent upgrade of our internet services link to 48 kps (July 2000) has ensured faster accessibility, both to the RSMC Nadi Page by clients, and external meteorological sites (particularly tropical cyclone pages) by forecasters. There are plans to further upgrade the Internet service link to 128k bps.

2.4.3 Quality Assurance

RSMC Nadi has been embarking on a Quality Assurance (QA) programme, in close cooperation with the Meteorological Service of New Zealand Ltd. The purpose of such a programme is to measure the quality of service provided by FMS and seek ways to improve our performance. As required by the programme, the Department is gradually documenting processes and procedures crucial to its operations. In terms of its functions as an RSMC, the Weather Forecasting Division has started a 24-hour forecast verification for Fiji that will slowly be extended to other island nations. Plans are also underway to conduct verifications on our aviation forecasts. The aim is to let our customers know of our capabilities before providing a service and to make our services compatible with international standards.

2.4.4 Partnership with the Media

Following face to face meetings and relevant workshops with local media organisations, RSMC Nadi and its services have been enhanced greatly, securing public awareness as a positive spin-off. RSMC Nadi also participated in the Expert Team on Media Issues meeting in the US in 1999, which recommended certain practices to be followed by the media and NMHSs, but particularly warning centres, to ensure timely broadcast of user-friendly information,

2.5. Future

Through provision of its specialised services in weather forecasting and cyclone and other severe weather warning, RSMC Nadi-TCC has been making a valuable contribution towards the economic and social development of Fiji and many of its neighbouring Island Nations. It hopes to maintain this role and aims to become the leading meteorological service in the tropical South Pacific region to be looked upon for expert information and advice, particularly to reduce the impact of meteorological disasters.

The completion of a major technology and facilities upgrade project recently places RSMC Nadi-TCC on par with the most developed meteorological services within the region and beyond. It possesses state of the art meteorological equipment, computer

systems and other facilities for making accurate weather predictions. Furthermore it has the most modern in design communications infrastructure for an effective product dissemination system to serve its customers and the general community, both locally and abroad. Over the next few years, RSMC Nadi-TCC aims to develop a wide range of tailored products for its customers. This includes an expansion of its* Weather Fax*, and further development of its services available from its web site on the* Internet*.

The Fiji Meteorological Service (FMS) provides a valuable service to many other countries of the region through RSMC Nadi. However, these services are yet to be formalised. The Fiji Government has committed itself to continue these services as its contribution to the South Pacific region, agreed for currently meets the full cost of these services. With the assistance of other relevant authorities, FMS aims to proceed with the establishment of necessary formal arrangements for its services in the near future. It also hopes to gain full recognition and trust of its services by the governments of all countries in the region.

The recent political crisis in Fiji is bound to affect RSMC Nadi resources, in particular its staffing. With the likely loss of both professional and technical skills, FMS will embark on a vigorous recruitment and training programme to ensure maintenance of quality services in the future. At the same time, it will engage in much needed research and development activities to improve the understanding and warning of cyclones and other meteorological hazards affecting the Southwest Pacific region in its effort to mitigate loss of life and property.

1st September 2000

APPENDIX X

SPREP/WMO PROJECTS 1, 2, 3, AND 4

(only hard copy available)

APPENDIX X, p. 2

APPENDIX X, p. 3

APPENDIX XI

SAMOA POST TROPICAL CYCLONES COORDINATION MEETINGS

1999/2000 POST TROPICAL CYCLONE SEASON REVIEW AND FIFTH SAMOA (INDEPENDENT STATE OF SAMOA AND AMERICAN SAMOA) COORDINATION MEETING

3 TO 4 JULY 2000, APIA, SAMOA

Introduction

The Samoa Meteorological Service Division (SMSD) is responsible for preparing and issuing tropical cyclone warning in Samoa. The Regional Specialized Meteorological Center in Nadi, Fiji (RSMC – Nadi) issues Special Advisory for the Independent State of Samoa and American Samoa.

The Independent State of Samoa and American Samoa entered into agreement in 1998 to work together on tropical cyclone warnings for the two countries. Since 1998, there have been several coordination meetings between the two countries on tropical cyclone warnings, with the objective of improving coordination of preparing and issuing tropical cyclone warnings for the two countries.

Participants

The list of persons attending the Fifth Coordination meeting, is presented in Annex I.

Purpose of report

The purpose of this report is to highlight the major outcomes of the 1999/2000 Post Tropical Cyclone Season Review and the Fifth Coordination Meeting between the Independent State of Samoa and American Samoa.

Discussions and Recommendations

Summary of Samoa Meteorological Service Division

- The emergency backup generator has arrived in Samoa, and will be installed within two weeks.
- The 1999/2000 tropical cyclone season was a quiet one.
- The National Disaster Council (NDC) has not met within the past year, and the new terminologies has not been put in place in the Samoa Disaster Plan. The meeting recommended that SMSD would follow up with the NDC to ensure that the revisions are approved.
- The meeting suggested accurate operational log records is maintained by SMSD for each event and reviewed afterwards for possible lessons learned.
- The meeting recommended that SMSD and US NOAA NWS Pacific Region prepare a report on the Independent State of Samoa and American Samoa Agreement, and a review of its effectiveness for the upcoming WMO RA V Tropical Cyclone Committee for the South Pacific and the South-East Indian Ocean, scheduled to be held in Rarotonga, Cook Islands, 5 to 11 September 2000.
- The meeting also recommended a gust recorder for SMSD.

Summary of USA NOAA NWS Weather Service Office Pago Pago, American Samoa

- The 1999/2000 tropical cyclone season was a quiet one. Highest warning was a wind advisory.
- Marine advisories, i.e., small craft advisories were issued. Marine advisories are not considered part of the tropical cyclone warning system, and are issued for mariners regardless of wind categories over open waters.
- It was a hot tropical cyclone season, and a near normal rainfall, though quite variable in rainfall distribution. The meeting recommended that a standard format for reporting of operational forecast performance after each event that would be shared between the Independent State of Samoa and American Samoa, and also be shared with RSMC – Nadi and US NOAA NWS Central Pacific Forecasting Center in Honololu.

Summary of Nadi – Regional Specialized Meteorological Center

- Because of the strong ENSO/La Nina, it was a quiet season for the Samoa area, which is one of the generating areas for the South Pacific.
- The cyclone trough did not establish itself in one area of the South Pacific in the 1999/2000 season, but moved around to different parts, and generated 6 cyclones for the entire season.
- The meeting agreed that RSMC – Nadi uses the Special Advisory for Vanuatu format as a starting point to develop the Special Advisory for Samoa (Annex II).

Review of tropical cyclone terminology

- The meeting reviewed the Tropical Cyclone Warning procedures and terminology in English and Samoan and made changes, as necessary. Concerns in the differences in Samoan terminology for Trough of Low Pressure (weak vs. active) were raised.

Coordination procedures

- Extensive coordination may be required to establish SMSD WMO identifiers in advance of the re-establishment of the AFTN service.
- Concerns were raised on Storm Watch issued every six hours and the Gale Warning is issued every three hours according to the Annex I in the Samoa National Disaster Plan, last revised October 23, 1999.
- The meeting agreed that Gale Warnings and Gale Watches to be issued every six hours. Storm Watches will be issued every six hours, and Storm Warnings every three hours. It was re-agreed that Small Craft Advisories and Wind Advisories to be issued every twelve hours. In addition, it was re-agreed that the tropical cyclone products and Small Craft/Wind Advisories would be issued when needed and then at the next regularly scheduled time which can be less than 6 or 12 hours respectively. It was also agreed to look at the records of agreements of procedures from the past meetings.
- The meeting agreed that US NOAA NWS WSO Pago Pago and SMSD would both use the Hurricane Local Statement (HLS) format for Tropical Cyclones.
- The meeting recommended that US NOAA NWS WSO Pago Pago review the current format of the HLS and ensure it meets the standard set by US NOAA NWS Central Pacific Forecasting Center in Honolulu.

- The meeting also recommended that SMSD uses HLS format is presented in Annex III.
- SMSD and US NOAA NWS WSO Pago Pago would meet and discuss the contents of Samoa Meteorological Service Division Operational Manual and US NOAA NWS WSO Pago Pago's Station Duty Manual.
- RSMC - Nadi forwarded their Marine Bulletin to New Zealand by email and then it is put on EMWIN.
- SMSD sent their product to New Zealand but it doesn't get on EMWIN. The meeting recommended that SMSD finds out why its products and messages are not getting on EMWIN.

Training

- New International Pacific Training Desk is being established, and will have its first student no later than November 1, 2000.
- Mr Akapo Akapo, from US NOAA NWS WSO Pago Pago, provided a week training of tropical cyclone forecasting to SMSDstaff, in Apia, in November, 1999.
- Quick Scat (Scatterometer data) is available on the Internet. The meeting recommended that US NOAA NWS Pacific Region would add a link on the Samoa Home Page.
- The meeting recommended that the Joint Independent State of Samoa and American Samoa disaster training exercises for the US NOAA NWS WSO Pago Pago and SMSD staffs are needed before the next tropical cyclone season. US NOAA NWS Honolulu and RSMC – Nadi would investigate the possibility of establishing joint training exercises.
- WMO is sponsoring a Tropical Cyclone training workshop in Melbourne, in October, 2000. The first week will be on tropical cyclone forecasting, and the second week will focus on public weather services.
- SMSD submitted two candidates for the ten month Class I Meteorologist course in 2001 in Melbourne.
- Third Country Training Course (funded by Japan) for meteorological observers (one month long) will be conducted at the RSMC – Nadi Training Centre in October, 2000.
- There was a discussion of exchange of staff personnel among SMSD, US NOAA NWS WSO Pago Pago and RSMC - Nadi. The meeting agreed that a formal proposal would be required from SMSD.

Backup facilities

- The backup portion of the Independent State of Samoa and American Samoa Agreement was revised since the last meeting to exclude the SMSD backing up US NOAA NWS WSO Pago Pago, American Samoa.
- The meeting recommended that a list of products and dissemination methods for SMSD needs to be identified and provided to US NOAA NWS WSO Pago Pago, and WSO Pago Pago will provide that list to the US NOAA NWS Central Pacific Forecasting Center in Honolulu.

Definition of tropical cyclones

- This was deferred to the WMO RA V Tropical Cyclone Committee for the South Pacific and South-East Indian Ocean, scheduled to be held in Rarotonga, Cook Islands, 5 to 11 September 2000.

Use of small craft warnings, wind advisories, high wind warnings and gale warning

- Concern was raised on what to use for gale force winds observed or forecast over land during the off-season. US NOAA NWS WSO Pago Pago would like to issue High Wind warnings for gale force winds over land. However, it would mean introducing another warning category/product to the public. The meeting recommended to stay with the current terminologies, and review them next year.

Model guidance

- The meeting agreed to get the UK and NOGAPS model onto the Samoa Homepage, and provide the software to loop the downloaded model files.
- The meeting recommended to establish a link to the US NOAA NWS Central Pacific Forecasting Center in Honolulu's Surface Analysis and the Wave Watch III model data on the Samoa Homepage.
- The meeting also recommended to investigate how US NOAA NWS Central Pacific Forecasting Center in Honolulu and US NOAA NWS WSO Pago Pago can acquire the Australia GASP model data.

E-mail

- SMSD has an e-mail server and dials in every ten minutes to their ISP to send and retrieve e-mail messages.

Media interactions

- The meeting recommended to contact Mr Arona Ngari, Director of the Cook Islands Meteorological Service, to obtain his PowerPoint/Real EMWIN program to develop meteorological products for television.
- SMSD would like the have the capability to develop the appropriate products and then directly record them on VCR tape as workload permits. Then the media could pick up afterwards. SMS doesn't want the media to interrupt personnel while they are trying to issue other products or meeting certain deadlines.

Handar stations

- The meeting recommended US NOAA NEWS Pacific Region request the output from the AWIPS application ARC Decoder program onto the Samoa Web Page.
- The meeting also recommended that US NOAA NWS WSO Pago Pago and SMSD to get together to provide a list of ARC sites for relocation or establish new sites, with first priority for tropical cyclone monitoring, and secondly for day to day forecasting, e.g. move the Faleolo International airport Handar to another location along the southwest coast of Upolu.

Other issues

- The meeting recommended that US NOAA NWS Pacific Region obtain a Gust recorder for SMSD.
- The meeting recommended that SMSD will investigate the possibility of using High Surf Advisories in consultation with US NOAA NWS WSO Pago Pago.

Annex I

LIST OF PERSONS ATTENDING THE 1999/2000 POST CYCLONE SEASON REVIEW AND 5TH SAMOA COORDINATION MEETING, 3 TO 4 JULY 2000, APIA, SAMOA

Faatoia Malele - Director, Samoa Meteorological Services, Apia
James Weyman, Director, Central Pacific Hurricane Center, US NWS PR Honolulu
Pene Lefale - Meteorology/Climatology Officer, SPREP, Apia
Ed Young - Chief, Technical Services Division, US NWS PRH Honolulu
Henry Taiki - Programme Officer, WMO Sub-Regional Office for the South-west Pacific- Apia
Alipate Waqaicelua - Manager, Forecast Services, Nadi RSMC
Niko Kaisa - Scientific & Climatology Officer, SMS- Apia
Eseese Ah ken - Scientific Officer, SMS-Apia
Itutu M.S Kamu Principal Scientific Officer, SMS-Apia
Taala Liae - Senior Scientific officer, SMS-Apia
Sagato Tuiafiso - Scientific Officer / Information Technology Administrators, SMS-Apia
Delores Clark - Public Information Officer, NWS PRH Honolulu
Karl Turner – Chief, Data Systems Branch, NWS PRH
Leilua Akapo Akapo - Warning Preparedness Meteorologist, NWS Pago Pago, American Samoa
Alefosio Matulino – Manager of Air Traffic Services, Samoa Airports Authority

Annex II

FORMAT FOR SPECIAL ADVISORY FOR SAMOA

WMO Header

2. Special Advisory (*Number*) for Samoa on (*Tropical Depression/Tropical Cyclone (name))* issued by RSMC Nadi at (*Date/Time*) UTC

3. (*Tropical depression/Tropical cyclone (Name*)) with a central pressure of (HPA) was located at (*Latitude/Longitude*) at (*Date/Time*) UTC. Position (*poor/fair/good*) based on HR GMS or GOES EIR and Vis imagery.

4. (*Tropical depression/Tropical cyclone (name)*) moving (*direction*) at (*speed*).

5. Maximum sustained winds near center are estimated to be (*knots*).

6. Winds above (*knots*) extended to (*miles*) of center and winds above (*knots*) about (*miles*) from center).

7. Description of tropical depression/tropical cyclone behaviour during past 6 to 12 hours

a) Meteorological discussion (*trough locations/movement, model indications, satellite descriptions and classification, etc.*).

8. Forecast position *(latitude/longitude)* and intensity (central pressure (hPa)/maximum 10-minute-average wind speed (knots)) during 12 and 24 hours ahead, and trend to 48 hours.

a) Possible impacts for the Samoa group (*wind damage, coastal flooding, etc.*)

9. Time of next advisory from RSMC Nadi.

10. Request Samoa to acknowledge advisory.

Annex III

SAMOA SIGNIFICANT EVENT REPORT FORM
"PRELIMINARY" FOR THE RECORD

OFFICE/PERSON FILING REPORT	
CURRENT DATE/TIME	
DATE(S) AND TIME(S) OF EVENT OCCURRENCE	
EVENT DESCRIPTION (SUMMARY AND IMPACT)	
DEATHS? HOW MANY? TIME/ LOCATION/AGE/SEX	
ADDITIONAL DETAILS (ON DEATHS)	
INJURIES? HOW MANY? TIME/LOCATION/AGE/SEX	
ADDITIONAL DETAILS (ON INJURIES)	
EXTENT OF DAMAGE (INCLUDE TALA ESTIMATES, IF POSSIBLE)	
WATCHES IN EFFECT? TYPE AND NUMBER/ VALID TIME	
WATCH AREAL EXTENT	
WARNINGS IN EFFECT? TYPE AND TIME ISSUED/ VALID TIME/ LEAD TIME	
EVACUATIONS? HOW MANY? LOCATION/ TIME	
NWS EQUIPMENT UTAGES>>>EMWIN, AFTN, OTHER?	
EVALUATION OF SERVICES E.G. HOW WELL WE DID	
COMMENTS/SERVICE	